ELECTRICAL REVIEW

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Technical Editor: C. O. BRETTELLE, M.I.E.E.
Industrial Editor: J. H. COSENS

23rd January, 1948

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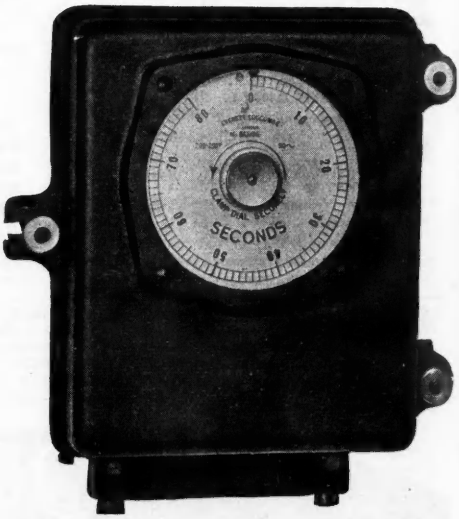

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ELECTRICAL REVIEW

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Continuity of Employment

Effect on Future Prospects

IN industry to-day, and perhaps more particularly in the electrical industry, a new meaning appears to have been given to the old principle that younger personnel should seek to gain variety of experience before specializing in one section for which they have a natural aptitude. The tendency in some quarters to travesty this principle by interpreting it as encouraging frequent changing of jobs is fraught with possibly serious consequences, not only to the young engineer but also to industry as a whole.

Drawbacks of Too-frequent Changes

That individuals should be free to move from one position to another is beyond question, and the wider experience gained can be of great value. In many instances, however, such movements—possibly due to post-war restlessness rather than to any clear regard for future prospects—are being overdone to the point at which employers are unable to count upon the continuing service of the younger members of their staffs. The latter in turn find their promotion retarded because their tenure of office with a firm is regarded as uncertain. The prospect of their departure is always present in the minds of those who would wish to give them positions of trust and added responsibility. Among other drawbacks, this hesitancy may prevent a graduate of one of the senior institutions from occupying a position of superior responsibility for the number of years required to secure corporate membership.

The knowledge to be picked up through a short stay with one concern is usually no more than a smattering, and would not count for much in assessing its value as experience. Moreover, quick changes of employment are apt to gain for a man an unenviable reputation as a " rolling stone " as revealed by his references, and the reason for them may not always be charitably attributed to the exercise of the candidate's own initiative. They tend in time to depress salaries, since they furnish a semblance of reason for the excuse that a man holding a minor post is paid partly by the experience he gains in his work. It is perhaps not without significance in this connection that uncertainty as to whether an employee will remain after the expense and trouble of training have been incurred is advanced as a reason for lower payments for female labour.

Reward for Service

On the other side, if continuity of service is to be encouraged an employer must not underestimate the market value of his loyal staff. To say that a subordinate " could not be replaced at twice his salary " is an admission that no employer should have to make. During the present manpower shortage, he is perhaps too prone to acquiesce in the idea prevalent among the younger generation that a mere change of position ought to mean a step higher on the ladder of financial gain, whereas the employee is really worth only a smaller salary until he has given evidence of competence in unfamiliar work. There might be a partial remedy in agreements, but these at best savour of mutual mistrust

and serve only to postpone the issue. Surely the fairest way to retain those likely to be assets to a firm is by salary increments and privileges depending upon years of service, in addition to hopes of promotion if opportunities should occur.

We feel there is still much to be said for the idea that long service in one firm is a record to be proud of, and, with the loyalties it engenders, something that is peculiarly British in character.

A Slow-Down

IN view of the present industrial activity, an increase over 1946 of only 3·4 per cent in kWh generated last year forms a curious contrast to the 10·6 per cent advance recorded during the previous twelve months. Monthly returns in 1947 ran down fairly steadily from 12·8 per cent in January to 1·4 per cent in December. No doubt there were several causes, such as the greater use of private plants, the more efficient operation of factory machinery, the response of householders to the appeal for economy, and the weather conditions. Some indication of these will be provided when figures are available regarding sales to various classes of consumers.

Prolonging Battery Life

ALTHOUGH accumulators for meeting part of the load on public mains are now but historical curiosities, their present duties are no less vital to the maintenance of supply. Their use for closing and tripping circuit breakers, providing emergency lighting and in various auxiliary duties has entailed close co-operation of battery makers, consulting engineers and switchgear manufacturers. Consequent experience in the selection of circuits has led to a considerable increase in the life of the cells. In this week's issue (page 119) Mr. E. R. Sanderson shows the advantages of paying attention to this aspect.

Costly Non-standards

USERS' special requirements greatly predominate over the other two main obstacles to standardization, viz., diversity of individual manufacturers' designs and expanding technical developments. During the discussion of the I.E.E. paper by Messrs. D. E. Lambert and J. Christie, it was made clear that, despite British Standards, too many users still call for variations from stock productions that are without substantial technical justification. These represent waste, especially of the time of draughtsmen who are occupied fully on urgent and necessary work. It is a difficult question to decide when the duty to meet the real need of a buyer shades off into a mere pandering to whim. At the moment it should be easier to explain the difference in price and delivery time that any deviation from normal must entail.

Accent on Export

SINCE quantity production and hence standardization is essential to coping with export requirements, some slowing down of technical developments that are in the workshop stage may have to be accepted. That need not, however, prevent "back-room" progress with a view to later activities, when the heavy development expenses of new designs can be better afforded. Standardization of switchgear will have to be related first of all to export in the more immediate future. While much may be done to eliminate intermediate current, voltage and MVA ratings, the simplest beginning will probably be to tackle accessory features. The setting up of provisional standardization panels (between issues of revised British Standards) would be of assistance in this connection.

Channel Tunnel Scheme

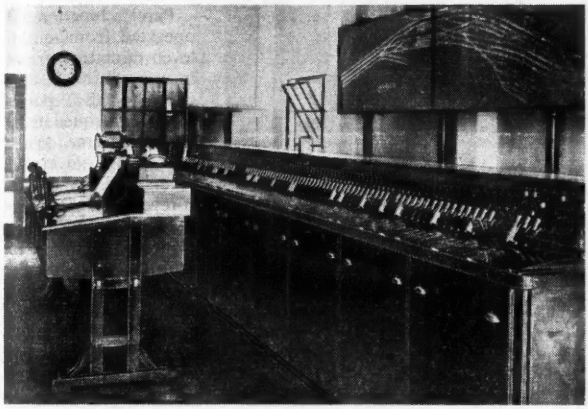
THE present would seem an unpropitious time to revive the half-century-old Channel Tunnel project, when even such essential works as generating plant extensions have had to be curtailed. Against this it can be argued that the plan, which would take eight or nine years to carry out, would not make large calls upon our labour and material resources in the early stages. Further, as our economy will depend more than ever on overseas trade in the future, such a link with the Continent would be of immense national benefit. Apart from the train connection between Britain and France, which would almost certainly be electric, the scheme offers interesting possibilities as a route for other electrical services between the two countries. It is stated that the proposals now being discussed by the Parliamentary Channel Tunnel Study Committee and a Committee of the Conseil de la République would cost between £40 million and £50 million.

Power Signalling

Its Application to an Indian Railway

By H. C. Towers,
M.I.E.E., M.I.R.S.E., M.Inst.T.

BOMBAY, a twelve- by three-mile city on India's west coast, is served by the Bombay, Baroda & Central India Railway and the Great Indian Peninsular Railway, the latter having an electric service reaching over 100 miles (161 km) to Poona. The Victoria G.I.P. terminal is signalled by colour lights, which give the greatest simplicity of indication, and all points are electro-pneumatically operated from power-signal cabins.



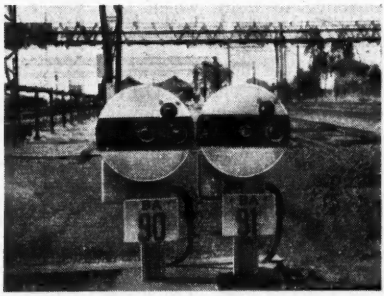
Power-signal cabin at Bandra

The writer was intimately concerned, as Divisional Signal Engineer, with the installation of automatic and power signalling on the B.B. & C.I. Railway. Bombay Central Station, its long-distance terminal, has nine platforms and many sidings. The signal cabin, opened with the station in 1930, contains a power frame of 119 levers operating 30 colour-light signals, 33 shunt signals and 37 electro-pneumatic point layouts. Parel running sheds and Mahalakshmi were later converted to colour-light signalling, retaining mechanical operation of points except for Mahalakshmi "A" cabin where all points are electro-pneumatic.

The electrified local line extends 37 miles (60 km) from Churchgate terminal, 4 miles (6·4 km) from Bombay Central, to Virar. Tracks are quadrupled for about 21 miles (34 km) between Grant Road and Borivli. Long-distance steam traffic operates on the fast lines only, separate from the electric trains. Two tracks run from Churchgate to Grant Road (4 miles, 6·4 km) and from Borivli to Virar (10 miles, 16 km). Between Bandra and Grant Road, non-stop electric trains run during peak hours at 40 to 60 m.p.h. (64 to 97 km per hr).

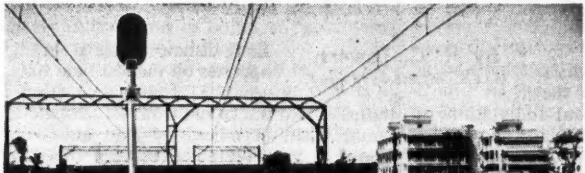
Tata's hydro-electric scheme supplies 22,000-V power, with substations at Grant Road, Bandra, Kandivli and Bassein Road, the last-named using Hewittic glass-bulb rectifiers. Owing to track trespassing, overhead current collection has been adopted and 1,200-V, d.c. power is fed to the contact wires.

Three-aspect colour-light signals were first installed at Marine Lines and Charni Road on the Churchgate–Grant Road section in 1928, being originally used as two-aspect signals controlled from miniature lever frames in the station offices. The interlocking at Churchgate operates from a cabin containing a 23-lever all-electric frame. The signals are two- and three-aspect, and the points are



Solenoid type disc signals

worked by means of 110-V all-electric machines. The signalling system between Churchgate and Grant Road was converted from two-aspect to fully automatic three-aspect in 1934.



Automatic signal at Dadar

Bandra, 10 miles (16 km) from Churchgate, originally had mechanical semaphore signalling. In 1935 20 colour-light signals, 25 electric-disc shunt signals and 28 all-electric points were brought into use, operating from a 101-lever power frame housed in a concrete cabin, and displacing 84 mechanical signals and three cabins. Terminal facilities are provided, and six sidings are used by B.B. & C.I. trains reversing to Churchgate during peak hours and by the G.I.P. electric service between Bandra and Victoria terminus via that railway's harbour branch. As far as is known, this installation was the first in India to use a solenoid-type disc signal for shunt movements. All mechanical shunt signals are now being converted to discs, which are more suitable than miniature arms.

Mahim, the junction between the B.B. & C.I. and the G.I.P. harbour branch, has a power cabin similar to that of Bandra which was opened to traffic in 1935. It contains a 50-lever frame, and also controls the parallel junction between the local and fast lines. Colour-light signalling between Parel Junction and Mahim was completed with the conversion in 1937 of the Dadar through-lines cabin. Here, power working made it possible to close the north cabin and operate the goods yard connections by power from the south cabin (now known as Dadar cabin). A telephone between the outlying points and the cabin facilitates shunting.

Parel Junction is operated from an 11-lever miniature frame in the stationmaster's office, the points being controlled from the same frame. When the king lever is reversed a key can be extracted which locks in reverse all the levers controlling the main-line signals, which then work automatically by means of the track circuits.

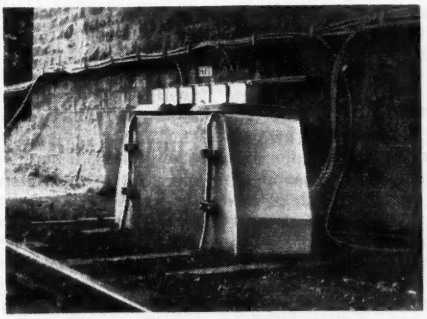
Miniature control frames are also used at Elphinstone Road local and Matunga level crossings (between which there are eight fully automatic signals). At Elphinstone Road a 5-lever frame controls a trailing connection between the loco shops and the down local line, the signals of which normally work automatically through a king lever. The frame at Matunga controls all signals on the local and fast lines, which are interlocked with the level crossing gates. This system is operated successfully by the gatemen.

Brick and asbestos relay and fuse cubicle

Purely automatic signals are distinguished by a large letter " A " in black on a circular, white-enamelled iron plate for easy recognition by motormen and engine crews. A

special rule applies in the event of their failure. If a " stop " signal does not change to yellow or green after a prescribed interval (one minute by day and two by night), the driver may proceed with great caution, prepared to halt at any obstruction, to the next signal. Should this also be at " stop " a similar procedure is adopted, but if it is clear he proceeds at normal speed to the next station, where the failure is reported. This rule is necessary because automatic signals are usually situated in isolated positions where no staff are at hand. It is in use in many parts of the world, and little difficulty has been experienced in its application.

At Parel and Elphinstone Road local, an " A " displayed beneath the signal is illuminated immediately the king lever is operated. When the control frame is in use the " A " is extinguished, and drivers know that the signal is now controlled and must not be passed at " danger " under any circumstances without a written authority.



Impedance bonds elevated above flood level

Colour-light signalling now extends for over 37 miles (60 km) from Churchgate to Virar, and includes 406 two- and three-aspect colour-light signals, 28 solenoid disc signals, 43 globe type shunt signals, 65 electric-pneumatic points and 85 all-electric points. Continuous-track circuiting being employed throughout, a 1½-min headway is possible at many parts. Eight power cabins have been introduced and nine mechanical cabins out of 24 retained, making a total of 17.

For station lighting and other purposes, a 2,200-V three-phase supply runs the whole length of the electrified line, and from cubicles at each station a 110-V supply is stepped down for signalling. This is distributed either by a twin 7/·064 cable or by 7/·064 Endural-covered overhead conductors, insulated to prevent frequent interruptions caused by crows dropping pieces of wire across the lines.

Power-Factor Improvement

When all-electric point machines were installed at Dadar it was found that winding over caused a heavy voltage drop on the mains which affected the signal cabin, causing signals to return to " danger." As a larger section cable could not be obtained quickly it was decided to arrange for power-factor improvement, and six 20 μF " Pyranol " capacitors were installed, 40 μF at the service box near the points and 80 μF across the cabin busbars. This increased the power factor from 0·73 to 0·84, with corresponding improvement in voltage. There was no further trouble, and capacitors have since been installed at many other places.

Track Circuit and Signal

The running rails being required for the return traction current, impedance-bond track circuits are used throughout with two-element vane relays, the average power consumed by each being 55 VA. Each aspect of the colour-light signal is equipped with a three-pin 12-V, 25-W lamp with double filament. Control lines are energized at 110 V, each lamp having a baby transformer stepping down to 12 V. The secondary winding has taps for voltage adjustment.

Point Operation

For the air supply to the points at Bombay Central, two Sentinel 2-stage compressors made by Alley & Maclellan, Ltd., and driven by 10-h.p. induction motors are housed in a modern concrete structure with workshop attached. These cut in when the pressure drops to 60 lb per sq in. (4·2 kg per cm²) and cut out when it rises to 70 lb per sq in. (4·9 kg per cm²). In addition, an air gauge fitted with a contact rings a bell if the pressure falls below 50 lb per sq in. (3·5 kg per cm²). The motors work on alternative supplies. Owing to tropical conditions the cooling water temperature could not be kept down to 100 deg F (38 deg,C) as recommended by the makers, and a Heenan water cooler was installed. A 67-cu ft (1·9 cu m) air-storage tank is placed outside the compressor house. The point motors have steel piston rings, owing to the difficulty in obtaining grease

that will not harden leather. Points at Churchgate, Parel, Elphinstone Road, Dadar, Mahim and Bandra are operated by a.c. all-electric machines. The switches are driven and locked normal and reverse by a 110-V a.c. series motor through a gear train.*

Relay Accommodation

Except for power cabins, which have a special basement relay room, separate rooms have been built adjacent to cabins. Entirely open steel relay racks and open wiring are used. The fuse bases are fixed to boards diagonally mounted so that the cables can enter at one side and the internal wires at the other.

Flooding

Tropical conditions call for special arrangements regarding installation of apparatus. At Grant Road during the monsoon the tracks are often flooded to a depth of 5 to 6 ft (1·5–1·8 m). At certain levels train operation is possible but the colour-light signals cannot be worked owing to flooding of the track circuits, and the key of an emergency lever (kept by the stationmaster) is then sent to the cabin and the lever is unlocked and reversed. This cuts out all the track circuit controls, and the colour-light signals work direct from the signal levers. Heavy rain at Grant Road also flooded the traction-signal impedance bonds fixed between the rails at track circuit junctions, and considerable difficulty was experienced in drying them out. To overcome this difficulty they are now placed outside the track on concrete piers or metal stands, clear of flood level, extra length of track connections being all that is needed.

The electric suburban service is used by a yearly increasing number of passengers, about 47 million being carried in 1938–39 and about 114 million in 1946-47. Many new motors, trailers and control trailers are on order from England, and by readjusting the signalling it is anticipated that the service can be further intensified.

All the work described above was carried out by the Signal Department's own Indian staff under the supervision of the Divisional Signal Engineer, Bombay, and the Deputy Chief Engineer (Signals).

* For details of electro-pneumatic and all-electric point operation, see "Railway Points," *Electrical Review*, 8th November, 1946.

B.E.A.M.A. Welding Division

Activities Reviewed at Annual Luncheon

THE annual luncheon of the Electric Welding Division of the British Electrical and Allied Manufacturers' Association was held at Kettners' Restaurant recently. Mr. J. I. Law-Brooks (Metropolitan-Vickers Electrical Co., Ltd.), who presided, outlined the general position of B.E.A.M.A. in welding matters and pointed out that its members included almost all the firms manufacturing arc welding electrodes, arc welding plant and resistance welding machines. An important function of this Division was to encourage the more widespread use and development of the arc and resistance welding processes and to this end they worked in close collaboration with the British Welding Research Association and with the Institute of Welding.

In touching upon some of the activities of the Welding Division during the past year, Mr. Law-Brooks mentioned the "Classification of Arc Welding Electrodes," produced in conjunction with the Institute of Welding, which had been accepted as a major contribution towards the development of arc welding and was being translated into several languages and reproduced in a number of industrial countries. The preliminary work in the formation of an International Institute of Welding had also been accomplished and in this connection Mr. Law-Brooks paid tribute to the work of Mr. G. Parsloe, secretary of the Institute of Welding in Great Britain.

Amongst the guests were Mr. V. A. G. Lambert, Director-General Armaments Production, Ministry of Supply, Mr. J. W. Blackshaw, M.B.E., assistant secretary, Engineering Industries Division, Ministry of Supply, and Mr. F. E. Parr, British Iron & Steel Federation. Sir Stanley W. Goodall, K.C.B., C.B., O.B.E., chairman of the Council of the British Welding Research Association, gave an interesting account of the work of that body, and Mr. J. L. Adam, president of the Institute of Welding, said that shipbuilding was the biggest industry using arc welding and a not inconsiderable user of the resistance welding processes, and was particularly indebted to the work of the welding equipment manufacturers and the Welding Research Association for their assistance in the development of welded ships. Mr. R. W. Ayers, chairman of the Resistance Welding Machine Section of B.E.A.M.A., thanked the chairman for his work in co-ordinating the activities of the electric welding industry in his capacity as chairman of the Electric Welding Industry Committee of B.E.A.M.A.

Storage Batteries

In Generating Stations and Substations

By E. R. Sanderson,
A.M.Inst.C.E., A.M.I.E.E.

LARGE-SCALE manufacture of equipment for generating stations at home and abroad has caused a considerable demand for storage batteries for various internal services. Early consideration given to the design of such batteries and their associated charging and control gear ensures greater reliability in the performance of their important duties, easier maintenance, longer life and less topping-up water. Long experience with thousands of batteries of this type shows that old ideas on their life must be discarded, and that a reasonable expectation of twenty years—probably appreciably longer with a carefully chosen charging and control system—makes the battery life comparable to that of general plant and switchgear. The well-proved Planté battery, with its very long life on trickle charge, is a thoroughly sound investment having a low depreciation rate and requiring no major overhauls for many years.

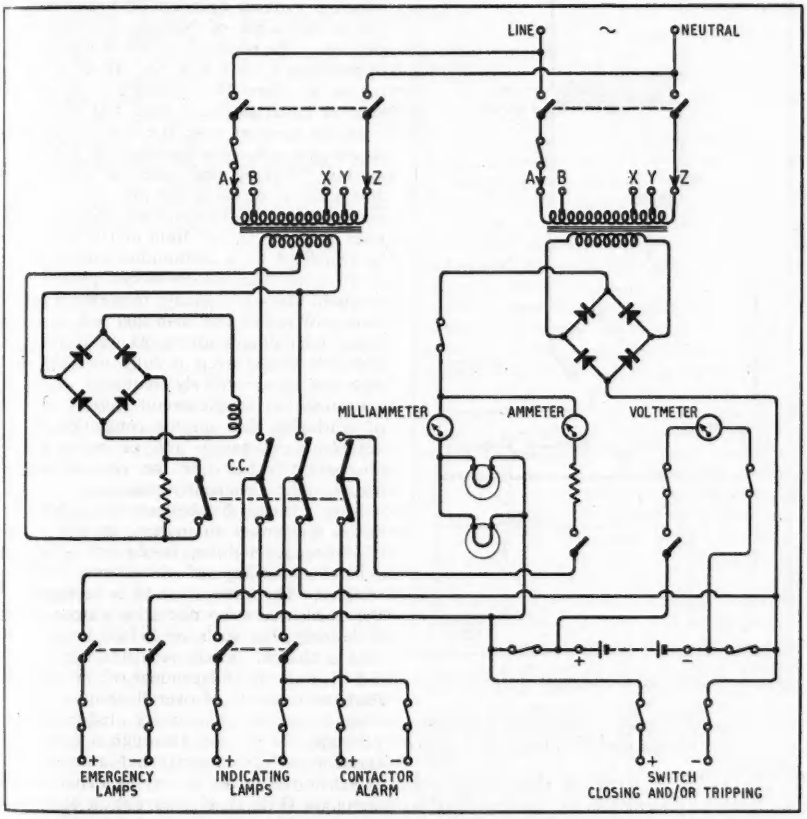


Fig. 1.—Connections for stand-by battery. Transformer-primary tappings A, B .... X, Y, Z give supply range of from 200 to 250 V

The storage battery and its associated apparatus and circuits must be designed in conjunction with those features of the station with which it will be connected. Its duties may combine several of the following:—Switch or circuit-breaker closing (solenoid or motor) and tripping (frequently of single switches but sometimes of a number simultaneously where there is busbar protection); feeding indicating lamps, on switch panels or in mimic diagrams, and "healthy trip" lamps; providing a stand-by to emergency- or pilot-lighting and alternator-excitation

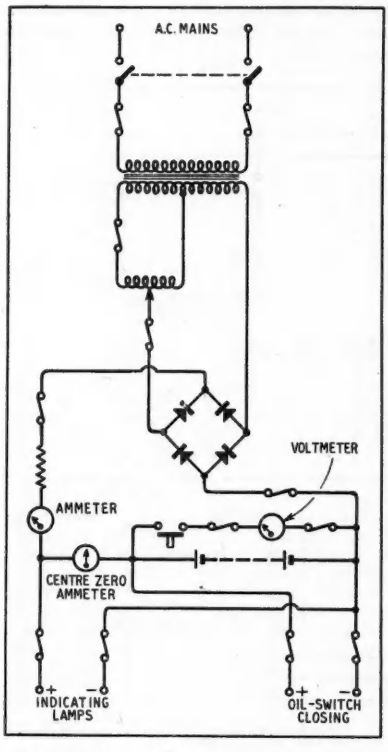


Fig. 2.—Floating trickle and quick charge rectifier

circuits, and to generating-station auxiliaries such as circulating and fire pumps and stoker motors.

The effect of some of these loads may be kept in perspective by stating that to close ten circuit breakers twice each, the solenoids taking 300 A for 1 sec, would discharge the battery by 1·67 Ah, whereas indicating lamps taking only 3 A in all would in a 3-hr emergency discharge it by 9 Ah. Thus a low current value is not necessarily insignificant. Further, since the available Ah over a wide range of discharge currents varies considerably for any given battery, a nominal size formula for a group of mixed duties is impracticable.

Trickle Charge

Regarding circuit design, although specifications occasionally call for frequent recharging from a motor generator, under modern conditions the aim should be to maintain the battery on a continuous 24-hr system requiring practically no adjustment or supervision. This is achieved by the trickle-charge system, which to balance open-circuit losses requires the maintenance of between 2·2 and 2·3 V per cell. The resulting trickle-charge current approximates to 1 mA per Ah of capacity (at the standard 10-hr rating), or less in the case of batteries larger than 100 Ah.

In the simplest case, the battery has only to energize solenoids momentarily for switch closing. Taking the solenoid current at 300 A for 1 sec (as in the previous example) and assuming ten switches are operated twice each in 24 hours, the drain of 1·67 Ah could be equalized by a continuous trickle charge of 70 mA. The battery would probably be of about 200-Ah capacity, requiring a trickle charge of rather less than 200 mA to counteract open-circuit losses, so an increase to 270 mA would keep it fully charged even with the above unlikely frequency of switch operation. A simple-circuit rectifier capable of delivering this current controlled by an adjustable resistance, and of providing an alternative higher rate for very infrequent use, would be eminently suitable.

More often, the battery has additional duties that entail an increase in size. That of emergency lighting would not affect the general suitability of the above type of rectifier. The battery would be recharged at the quick rate (also operating automatically if desired) after such use before reverting to trickle charge. Green-red indicating lamps fed by a circuit independent of the solenoid feed (an example of overall design) may be treated as an emergency lighting load normally fed by a.c. (through a step-down transformer if necessary) but automatically switched over to the battery by a change-over contactor (Fig. 1) on interruption of the a.c. supply. This simplifies the trickle-charge control and avoids over-voltage on the lamp

circuit. Incidentally, the momentary solenoid current is usually higher than the quick-charge current and the high charging voltages are not maintained.

In all these cases there is no difficulty in employing a fixed number of cells in the battery and eliminating end cells, which should be avoided wherever possible. It is simple to incorporate in the contactor connecting the emergency or indicating lamps to the battery an auxiliary contact to disconnect the charger output, thus ensuring that the battery is not maintained at a charging voltage whilst the emergency lamps are connected to it. It is advisable not to rely on a complete interruption of a.c. stopping the supply to the charging rectifier simultaneously with the connection of emergency lighting to the battery.

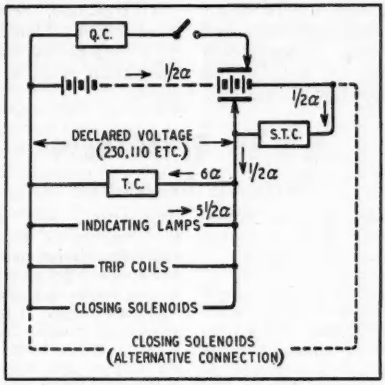


Fig. 3.—Circuit providing for end-cell trickle charging

Continuous D.C. Loads

From simple circuits we come to more complicated cases of continuous d.c. loads, e.g., for indicating lamps which cannot be supplied by the a.c./d.c. change-over method, "healthy-trip" lamps necessarily connected to the battery at all times, mimic busbar diagrams and retaining coils of d.c. circuit breakers in traction substations. None of these prevents the use of the trickle-charge system, since the rectifier can supply the sum of these continuous loads and the ordinary trickle current. But this necessarily imposes on these load circuits a voltage of 2·2 to 2·3 V multiplied by the number of cells in the battery. For example, a 110-V battery frequently has 58 cells to ensure a margin, during switch closing, in compliance with the relevant clauses of B.S. 116/37; at 2·3 V per cell this would mean 133 V applied to the continuous-load circuits. Moreover, since these loads would remain connected during the occasional quick charge up to a maximum of 2·75 V per cell, they would on occasions have to receive a pressure of 160 V. Frequently this is found possible by using 150- or 160-V lamps in the indicating, "healthy-trip" and mimic busbar circuits, or resistances in series with the lamps. In such schemes (Fig. 2) charger control must regulate in very fine steps over the required range of output.

If, however, the extreme charge voltage cannot be accommodated so easily (often a difficulty in the case of a 230-V battery which may reach 330V at the end of charge), the next best plan is to connect the full number of cells and the output of the floating-trickle charger to the continuous-load circuits during trickle charge (up to 2·3 V per cell), and to use an end-cell switch to reduce this number only during the very infrequent quick charge. Where continuous loads have to be supplied at scarcely more than the nominal circuit voltage, they must normally be connected to the same reduced number of cells as the floating-trickle charger. The voltage of end-cells left out of the main, balanced, circuit can be maintained by a small trickle charger that just balances open-circuit losses. This should have, at any current for which it is set, a nearly constant current characteristic even under the short-circuit conditions which will occur when all the cells are switched on to the load circuit during an emergency. In Fig. 3, Q.C., T.C. and S.T.C. represent the quick charger for infrequent use, the floating-trickle charger and the special end-cell trickle charger. The arrows and figures represent a continuous 5½-A load for indicating lamps and a ½-A trickle charge to all the cells. If the end-cell trickle charger were omitted, trouble would be involved in providing for regular freshening charges to the end-cells.

Where the continuous d.c. load connected to the battery and rectifier varies uncertainly, but between definite limits, one of several types of rectifiers providing an almost constant voltage characteristic should be used. Some C.E.B. substations employ a metal rectifier in which control is effected entirely by static means. Some generating stations, on the other hand, have mercury-arc rectifiers across which the batteries float,

automatic control being effected through a train of electro-mechanical devices.

Where large batteries are installed in power stations for emergency supplies to certain auxiliaries, charging and load circuits should still be so arranged that accurately controlled trickle charging is possible. Circumstances vary considerably at different stations and require individual consideration. Care may easily halve the depreciation rate, and give a battery life of twenty years or more instead of the seven years or so achieved under hit-and-miss methods.

To conclude, there is no reason why with good design a Planté type battery should not be a long-lasting, easily maintained part of the station plant, as many existing examples prove.

NEW BOOKS

Electricity in Industry

Britain's Industrial Survival. By Ian Bowen. (Pp. 204.) Faber & Faber, Ltd., 24, Russell Square, London, W.C.1. Price 12s. 6d.

Many factors which influence the industrial status of this country are studied in this economic survey and in particular the part which power plays in determining that status. Mr. Bowen presents the consumption of electricity as an index of national progress—not a new idea but a very sound one. He puts forward the view that " a steady increase of national income, necessary for any improvements in social welfare, can take place only if there is a wider use of power in production, and an increase in mechanization in industrial and domestic life." He contends, however, that this wider mechanization means a steady increase and constant change in the volume and type of capital goods. The formation of capital needs to be rapid and continuous.

In a chapter on " Industry and Electric Power " the author gives some indication of the extent of industrial electrification in Great Britain but his figures are perforce out of date, being taken from the 1935 Census of Production. The tide was then rising and it is hardly fair to compare, as Mr. Bowen does, this industrial consumption with that of the United States in 1939. We are still behind, of course, but statistics of the war's stimulation both here and in America are not yet available to enable a fairer comparison to be made.

It must be agreed that " as long as electricity is so important a source of power, any curtailment of the development programme as a crisis economy would be short-sighted and might even be disastrous." And yet it is happening.—J.H.C.

Industrial Electrification. By J. W. McQuillen, A.M.I.E.E., M.A.Min.E.M.E. Pp. 116; figs. 26; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 12s. 6d.

In this book of six descriptive chapters the opening chapter which purports to outline the duties and responsibilities of the industrial electrical engineer in some four pages might well have formed part of the author's preface.

In the following chapters an attempt is made to bring out the salient features of bulk supply or private generation; system design and distribution; they would be improved by the inclusion of more diagrams to illustrate substation design and the equipment section is rather too brief to be of much practical value to the works engineer and could be extended with advantage. The building layouts follow recognized practice but it is doubtful if lean-to roofs would be built; here again there is need for further information in many of the sub-sections. Some attempt has been made to describe the different methods of wiring now in general use and comparative costs of cables are included.

Flame proof installations for hazardous areas are next discussed, and some useful information is included which should serve as an introduction to this subject. The final chapter deals with the maintenance of equipment and various record cards are reproduced which are typical o general works practice.

Transformer, switchgear, motors and starters, general maintenance and the location of electrical faults are all dealt with in much too brief a manner to be of any great value.

An appendix which outlines the grading of definite minimum inverse time limit relays should be particularly helpful to works electricians. The bibliography could also be extended with advantage.

This book should serve as an introduction to industrial electrification, but its value would be greatly enhanced by the inclusion of many more illustrations and diagrams.—T.H.C.

Industrial Electrical Instruments. By G. W. Stubbings, B.Sc., A.M.I.E.E. Pp. 22. Emmott & Co., Ltd., 31, King Street West, Manchester, 3. Price 1s. 6d.

This pocket-size monograph (No. 13 in the " Mechanical World " series) is not concerned with design or construction. It explains in the simplest language for non-electrical users of power how voltage and amperage are indicated and energy consumed is generally metered.—W.O.F.

Book Received

Meter Engineering. By J. L. Ferns. Pp. 350; figs. 194; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 12s. 6d.

Views on the News

Reflections on Current Topics

MY admiration is unbounded for the strength of will of the applicant on the Witham Urban District Council's housing list who refused a house because it had a gas instead of an electric cooker. As has so frequently been demonstrated, housing authorities are very inclined to underestimate the growing popularity of electricity in the home. No matter what attempts are made to apportion the shares of the various fuels to particular applications—and this tendency is likely to be intensified when gas, as well as coal and electricity, is nationalized—there can be no halting the increasing demand for electricity and householders will rightly insist on making their own choice in matters of this kind.

* * *

Talking of cookers, one of the things that struck me most when I visited the Hotel, Restaurant and Catering Exhibition last week was the difficulty of knowing without the closest inspection whether one was looking at an electric or gas cooker. Imitation is the sincerest form of flattery it is said and certainly practically all the gas cookers are now fitted with taps and controls made to look as closely as possible like electric switches and thermostats. By concealing the burners, too, a very realistic solid hot-plate effect is produced. It was also to be noted that an electric device was used to show how a gas thermostatic control unit operated.

* * *

Those who have complained of the floods of Statutory Rules and Orders which have emanated from Government Departments during the past ten years might have had a momentary satisfaction when they learned that as from 1st January there would be no more "S.R. & O.s." I say "momentary," for reading on they found that in the place of S.R. & O.s there would be "Statutory Instruments." From the samples I have seen, these will be as complicated and unreadable as their predecessors and no doubt as numerous.

* * *

The installation of trolley-buses in Toronto, to which I have referred before, has lately been the subject of some controversy. An editorial in the *Toronto Daily Star* criticized the system because "the maze of wires and fixtures is unsightly in the extreme." Replying to this, the editor of the Canadian journal *Electrical News and Engineering*, observed that if overhead wires offended against the æsthetic sense, petrol buses were well known to offend two other senses—hearing and smell. My experience has been that people do not take much notice of these and other lines in towns, as opposed to the countryside, and very much appreciate the freedom from noise and fumes.

* * *

Another point of importance in these days is the length of service which trolley-buses give. A recent report by Mr. G. A. Vowles, of Ipswich, referring to the fact that it has not been possible to obtain any new vehicles during the past year, mentions that fourteen of the fleet are 21 years old, eight have seen 17 years' service and fourteen have been in use for 14 years. All have been maintained in a sound, roadworthy condition.

* * *

Two power companies on the Pacific Coast of the United States have warned their customers that they must expect service interruptions this winter and have asked them to be careful in their use of electricity from 10 a.m. to noon and from 4 to 6 p.m. The companies propose to make section by section cuts as we are doing here. It is as well to make it known that we are not the only sufferers from power plant shortages, cold comfort though it be. By the way, the mention of the period from 10 a.m. to noon suggests that on the Pacific Coast they start work a good deal later than we do.

* * *

Electricity cuts have led to a curious situation at Bridlington. In the quay area, in which cuts are made on Wednesdays if necessary, is a navigation light which indicates the depth of water in the harbour mouth and operates a foghorn. The Harbour Commissioners have pointed out the danger to shipping latent in the stoppage of these signals but the Council has expressed its inability to give individual supplies during "cut" periods. I cannot think that the amount of load shed by one section of Bridlington is sufficient to justify risks to vessels using the harbour.—**REFLECTOR.**

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Dangerous Installations

WITH reference to the two examples quoted by Mr. Burridge in his letter to you last week, the remedy is to report these and any similar installations to the electricity supply undertaking for the area concerned. They have power, under Clause 27 (*a*) of the Electricity Commissioners' Regulations, to refuse to give, or continue to give, a supply unless they are reasonably satisfied in all respects that all conductors and apparatus are constructed, installed and protected so as to prevent danger.

Moreover, under Clause 12 (2) of the Electric Lighting Act, 1882, which incorporates Section 18 of the Gasworks Clauses Act, 1847 (see appendix to Electric Lighting Act, 1899) the undertakers are empowered to disconnect the supply and impose a penalty if any person shall lay, or cause to be laid, any electric line to communicate with any electric line belonging to the undertakers without their consent.

The position therefore is that if any person, which includes the consumer or contractor, connects any installation or extension of such installation without the consent of the electricity supply undertaking, such installation or extension can be disconnected and a fine imposed; moreover, if consent is sought it can be refused if the installation or extension is not reasonably satisfactory in all respects.

By taking drastic action in such cases and giving publicity thereto, the undertakers can materially assist in the suppression of malpractices as quoted by Mr. Burridge.

*London, S.W.*1. F. W. PURSE,
Hon. Director,
National Register of Electrical Installation Contractors.

Peak-Load Control

I REGRET I am unable to let my friend Mr. A. E. Morgan's views on peak-load control pass unchallenged. He is, I assume, quoting from knowledge he possesses of the use of warning sirens in other districts, but his remarks do not apply to Southend. Any memories associated with the noise should be ones of relief as we only use the "all clear" signal. The siren is used only between 7.30 and 8.30 a.m. and 4.30 and 5.30 p.m. (the Fire Department having prior use at other times), and is reasonably effective for the full three hours we ask. Only once has it been necessary to sound it twice, and then it was because the first call did not produce a sufficient response.

The suggestion that the saving of peak-load charges will justify the expenditure involved in introducing new equipment will not hold water. Imagine an undertaking to be faced with a compulsory cut from 30,000 to 20,000 kW. It *must* cut, if necessary by switching, and thus lose certain revenue, lowering its own peak charges. To obtain this cut by installing buzzers loses the same revenue, lowers the peak charges by the same amount and adds the expense of the buzzers to offset which there is no additional saving.

Southend is equipped with centrally controlled disused pilot wires into practically every house in the borough, but it still would not pay me to equip houses with ordinary buzzers—let alone timed ones.

It is agreed that the usefulness of sirens would probably be limited in any other than a mainly domestic area, but this would appear to apply to any form of voluntary appeal.

R. C. GOLDING,
Southend-on-Sea. *Engineer and Manager.*

B.E.A. Staff Welfare

THE appointment at this early stage of a welfare officer to the British Electricity Authority augurs well for the future of the industry. Too few undertakings have had the foresight to appoint an officer whose duty is to advise and assist on all staff matters. I am sure that where such an appointment is in being the undertaking is amply repaid by having an efficient staff harmoniously working as a team.

I hope that the Welfare Officer will be able to gather about him an enthusiastic staff who will be able to overcome all difficulties, for in their hands lies the development of the team spirit of the B.E.A.

Welling, Kent. H. G. DULY.

Large Swedish Transformer

A 125,000-kVA, 200-kV transformer, claimed to be the largest rating yet built anywhere and costing 1·5 million kronor, is reported to have been delivered by the A.S.E.A. Co. to the Stockholm City power station.

PERSONAL and SOCIAL

News of Men and Women of the Industry

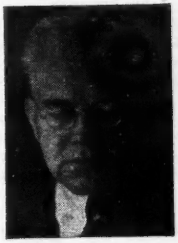
THIS week the British Electricity Authority announced the names of the divisional controllers for the fourteen divisions into which the country has been divided for generation and main transmission purposes. These divisions correspond geographically to the fourteen distribution areas under the Area Electricity Boards. The controllers' salaries range from £2,500 to £3,500, according to the responsibilities of the posts. The appointments are as follows:—

London.—Mr. J. N. Waite (Central Electricity Board). *South Eastern.*—Mr. W. C. Parker (Fulham). *Southern.*—Mr. R. H. Coates (Portsmouth). *South Western.*—Mr. J. T. H. Legge (Central Electricity Board). *Eastern.*—Mr. W. N. C. Clinch (Northmet Power Co.). *East Midland.*—Mr. W. S. Burge (Central Electricity Board). *Midland.*—Mr. F. W. Lawton (Birmingham). *South Wales.*—Mr. N. V. Pugh (Manchester). *Merseyside and North Wales.*—Mr. A. R. Cooper (Central Electricity Board). *Yorkshire.*—Mr. G. A. Vowles (Ipswich). *North Eastern.*—Mr. J. C. Mitchell (NE.S.C.O.). *North Western.*—Mr. C. T. S. Arnett (Central Electricity Board). *South East Scotland.*—Mr. J. F. Field (Edinburgh). *South West Scotland.*—Mr. E. J. Edgar (Central Electricity Board).

The London Area Electricity Board has made the following appointments: Chief engineer, **Mr. J. W. Leach,** M.I.E.E., engineer-in-chief, Central London Electricity, Ltd.; secretary, **Mr. W. H. Warhurst,** LL.B., town clerk of Hammersmith; chief commercial officer, **Mr. F. C. Fenton,** joint manager, County of London group.

The South Eastern Area Electricity Board has appointed **Mr. W. A. Gallon,** at present borough electrical engineer of Woolwich, as its chief engineer. **Mr. A. L. Burnell,** clerk and finance officer, London and Home Counties J.E.A., has been appointed secretary and **Mr. F. Sinnott,** borough treasurer of Worthing, chief accountant.

The Council of the Institution of Electrical Engineers has elected as honorary members of the Institution **Colonel Sir Thomas F. Purves,** O.B.E., for his distinguished work in electrical engineering, and his services to the Institution, and **Admiral Sir John H. D. Cunningham,** G.C.B., M.V.O., First Sea Lord and Chief of the Naval



Prof. M. L. E. Oliphant

Sir Thomas Purves

Staff, in recognition of the outstanding part played by him in stimulating the application of electrical techniques in the Royal Navy and the contributions made by officers of the Royal Navy to the applications and development of electrical science and engineering. The Council has also made the twenty-sixth award of the Faraday Medal to **Professor M. L. E. Oliphant,** F.R.S., for his distinguished work in nuclear physics and his original discoveries in the physical sciences, particularly in the realm of electromagnetic oscillations, their production, study and use.

Sir Thomas Purves was educated at Heriot-Watt College, Edinburgh and Edinburgh University. He entered the Civil Service in 1889 and following his appointment to the Engineering Department of the Post Office in 1892 he became assistant superintending engineer in 1905, staff engineer in 1907, assistant engineer-in-chief in 1919 and engineer-in-chief from 1922-1932. From 1932-1936 he was managing

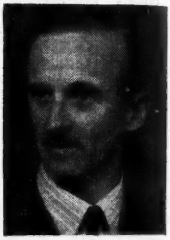
The South East Scotland Area Electricity Board at its first meeting in Edinburgh on 12th January at the offices of the Lothians Electric Power Co. Left to right: Capt. J. R. Thompson, Mr. W. S. Sawtell (deputy chairman), Sir Norman Duke (chairman), Sir Ernest Wedderburn and Mr. G. McLaren

director of the United Telephones Cables, Ltd., and at present he is director of the Cable Makers' Association. During the first European War he served as a major in the Army Signal Service (R.E.). He served as a member of Council from 1923-1926, was a vice-president from 1926-1929 and in 1929 he became president of the Institution. He is the author of a number of books and papers on electrical communication engineering and for his paper on "The Post Office and Automatic Telephones," which he read before the Institution in 1925, he was awarded the Institution's Fahie Premium.

Admiral Sir John Cunningham has had a distinguished naval career. During the war he served as rear admiral commanding the First Cruiser Squadron, flag officer commanding Force M, Fourth Sea Lord, Commander-in-Chief, Levant, and Commander-in-Chief, Mediterranean.

Professor Oliphant was educated at the University of Adelaide and Trinity College, Cambridge. He was Messel Research Fellow of the Royal Society from 1931-1934, when he became a fellow and lecturer at St. John's College. In 1935 he was appointed assistant director of research at the Cavendish Laboratory and in 1937 he became Poynting Professor of Physics in the University of Birmingham. The award of the Hughes Medal of the Royal Society in 1946 was followed by his election as an honorary life member of the New York Academy of Sciences. In the same year he delivered the thirty-seventh Kelvin Lecture.

In response to an invitation received from the Danish Institution of Civil Engineers (Dansk Ingeniörforening) **Sir Stanley Angwin**, K.B.E., D.S.O., M.C., T.D., was asked by the presidents of the Institutions of Civil, Mechanical and Electrical Engineers to act as their delegate to take part in the celebrations in Copenhagen this week organized by the Danish Institution to mark the opening of their rebuilt headquarters building "Engineering House." Sir Stanley is accompanied by Lady Angwin. The new headquarters replace the Institution's building destroyed by the R.A.F. in the spring of 1945, together with the next-door building which the Germans were using as Gestapo headquarters. A memorial plant was unveiled in commemoration of the Danish civil engineers who gave their lives during the war.



Mr. S. R. Mellonie

Mr. S. R. Mellonie, M.I.E.E., A.Am.I.E.E., A.M.I.I.A., distribution superintendent with the Salford Corporation Electricity Department, has been appointed deputy city electrical engineer at Salford. Mr. Mellonie was educated at the Manchester College of Technology and Northampton Polytechnic, London. He served his apprenticeship with Crompton & Co., and held appointments with the Metropolitan-Vickers Electrical Co., Ltd., A. Reyrolle & Co., Ltd., the Admiralty, and the British Thomson-Houston Co., Ltd., before going to Salford in 1929 as electro-technical assistant. He was appointed distribution superintendent in 1939. Mr. Mellonie is chairman of the North-Western Centre Installations Group of the I.E.E., vice-chairman of the North-Western Centre, and is on the E.R.A. Committees Sections Q and k/E.

Sir William Robinson, Major C. A. M. Alexander, Mr. A. W. Ferguson and **Mr. J. Walker** have been reappointed by the Minister of Commerce as members of the Electricity Board for Northern Ireland. Sir William Robinson is chairman of the Board.

The South Wales Area Electricity Board held its first meeting on Friday in Cardiff when the above photograph was taken. Left to right:—Back row: Sir Gerald Bruce, Alderman T. Evans and Principal R. James. Front row: Mr. Basil Curran, Councillor I. R. Thomas, Mr. L. Howells (chairman) and Mr. E. Jones (deputy chairman)

The Shropshire, Worcestershire & Staffordshire Electric Power Co. has made the following staff changes in its Northern Division with effect from 19th January: **Mr. S. Raybould**, district manager, Dudley, promoted to divisional engineer, Northern Division; **Mr. R. A. Jones**, district manager, Oldbury, becomes district manager, Dudley. **Mr. F. G. Haddon**, assistant district manager, Smethwick, becomes district

manager, Oldbury; **Mr. A. P. Lee**, promoted from district assistant to assistant district manager, Smethwick.

Mr. S. A. Lane has joined the board of the Brush Electrical Engineering Co., Ltd., and has been appointed general manager. Mr. Lane was formerly managing director of Tarran Industries, Ltd., and before that director and general manager of Mirrlees, Bickerton & Day, Ltd., which is now one of the oil engine manufacturers in the Associated British Oil Engine group.

Mr. S. A. Lane

Mr. S. G. Kelsey, chairman of Kelsey Industries, Ltd., the parent company of Multicore Solders, Ltd., recently left England on a trip to promote the sales of the company's products in overseas countries. Mr. Kelsey's journey will include visits to Ceylon, Australia and New Zealand.

Section presidents appointed for the annual conference of the British Association at Brighton in September include **Sir Lawrence Bragg**, F.R.S. (physics and mathematics) and **Wing Cdr. T. R. Cave - Browne - Cave** (engineering). **Mr. M. G. Bennett** is to act as general treasurer and **Dr. E. Hindle**, F.R.S. and **Sir Richard Southwell**, F.R.S., as general secretaries.

Mr. F. R. Mason

Mr. J. M. Surrall, general commercial manager, has been appointed a director of the Simplex Electric Co., Ltd. Mr. Surrall joined the original Simplex Steel Conduit Co., Ltd., in 1903, and was appointed manager of the Electrical Heating & Cooking Department in 1912. He served in the R.E. (Signals) from 1914 to 1919, and rejoined the company as assistant sales manager, becoming sales manager in 1922. On the formation of the Simplex Electric Co. in 1932, he was appointed joint sales manager, becoming general commercial manager in 1946.

Mr. J. M. Surrall

Mr. H. A. Cleaver, for over thirty years a member of the Purchasing Organization of the British Thomson-Houston Co., Ltd., Rugby, is resigning at the end of January to join the Midland Engineering Services Co., of Coventry and Rugby.

Mr. C. W. Marshall (C.E.B.), who was recently appointed deputy chief engineer (research) to the British Electricity Authority, has been awarded the Ampère Medal by the Société Française des Electriciens. Last year Mr. Marshall presented a paper to this body on "Recent British Practice in the Transmission of Electrical Energy."

Mr. H. Butterworth, A.M.I.E.E., sales manager of the Motor and Industrial Control Departments of the Metropolitan-Vickers Electrical Co., Ltd., has left the company to take up an executive appointment with the Edison Swan Electric Co., Ltd. **Mr. H. Boyd Brown**, B.Sc. (Eng.) has been appointed sales manager, Motor Department from 1st January, and **Mr. C. H. de Nordwall**, D.F.H., M.I.E.E., becomes sales manager, Industrial Control Department. **Mr. F. R. Mason**, B.Sc.Tech., A.M.I.Mech.E. will succeed Mr. Brown as principal representative at Trafford Park of the Metropolitan-Vickers Electrical Export Co.

Mr. H. Boyd Brown

Mr. C. H. de Nordwall

Mr. Brown joined Metropolitan-Vickers in 1931, having taken an engineering degree at the University of Witwatersrand. Following a college apprenticeship course he served in the Motor Engineering Department. In 1934 he joined the Johannesburg office and two years later became the company's engineer in Holland. In 1939 he returned to Motor Engineering Department and subsequently took charge of motor development. In 1944 he transferred to the London office of the M-V. Export Co., and in March this year he became that company's principal representative at Trafford Park.

Mr. de Nordwall received his technical training at Faraday House and served apprenticeships at the Fraser & Chalmers Engineering Works and with the M-V. Co. After a period in Nigeria as chief engineer of a large tin mine he went to Russia on the M-V. erection staff in 1930 and after three years transferred to the company's London office. In 1938 he joined the British Electrical Development Association as power development

engineer. From 1939 to 1945, Mr. de Nordwall served in various parts of Europe with the Royal Engineers, in which he attained the rank of colonel. On demobilization he joined the Control Commission for Germany, becoming Director of the Electrical Industries Branch.

Mr. Mason was educated at Stockport Grammar School and Manchester University. After a college apprenticeship with Metropolitan Vickers, and several years on power engineering work during which he obtained the Graduate's Prize of the Institution of Mechanical Engineers and also spent some time with A.E.I. (India), he was appointed engineer-in-charge of the paper mill section of the General Engineering Department at Trafford Park. During the war he was seconded to the Ministry of Aircraft Production as senior technical officer for the co-ordination of research and development on airborne electrical equipment. Mr. Mason is a member of the I.E.E. Committee on Safety Regulations for Civil Aircraft and is chairman of panels responsible for materials specifications and equipment testing.

Mr. E. A. Guthrie, A.M.I.E.E., has been appointed manager of the " American Division " of the Metropolitan-Vickers Electrical Export Co. Mr. Guthrie served his apprenticeship with the company, and has occupied various posts in the manufacturing and sales departments of the organization. In 1916 he joined Switchgear & Cowans as assistant sales manager and after holding a similar position with Ferguson, Pailin, Ltd., he rejoined the Switchgear Department of Metropolitan-Vickers. He was transferred in 1932 to the London office of the Export Co., and made numerous business tours abroad. He will continue to be at 1, Kingsway, London, W.C.2.

Sir George H. Nelson, chairman of the Marconi group of companies, speaking to the staff and employees at Chelmsford on 19th January, said that it had been decided to use the specialized knowledge and experience of **Capt. B. R. Willett,** C.B.E., D.S.C., the present general manager of Marconi's Wireless Telegraph Co., Ltd., by appointing him to undertake a mission to overseas countries with a view of increasing the company's export trade. His place as general manager would be taken by **Mr. F. N. Sutherland,** who had a wide experience in the English Electric organization and had recently been in charge of its affairs in South America and South Africa.

Major G. C. Milnes is retiring in March after thirty-seven years as electrical engineer at Lancaster.

Mr. N. S. Candy has resigned from the managership of the rubber cable & covered wire works of Enfield Cables, Ltd., to take up an executive appointment with Olympic Cables, Ltd., Melbourne. He was formerly with Scottish Cables, Ltd., Renfrew, and received his initial training with Pirelli-General Cable Works, Ltd., Southampton.

Mr. E. Landucci, deputy clerk to the West Midlands Joint Electricity Authority, has been appointed hon. secretary of the Electricity Supply Joint Committee. He succeeds Mr. H. F. Carpenter, who has relinquished the position following his appointment as secretary to the British Electricity Authority.

The annual staff dinner of F. Westerman (Wholesale), Ltd., was held on 10th January, at the Grand Hotel, Birmingham. **Mr. F. Westerman** made a brief speech and welcomed the visitors. Mr. B. I. Powell (Simplex), in responding, said that the company had made great progress in difficult times, which showed all-round co-operation.

In reciprocation for the party sponsored by the management of Vactric, Ltd., and held just before Christmas, the workers, through their works committee, on 15th January held a carnival dance, invitations to which were sent by the workers to the executives. During the evening there was a workers' cabaret with six acts by Vactric workers. Cash prizes were awarded by the company. This carnival dance followed a children's party held the previous Saturday, when nearly 250 of the workers' children were entertained in the factory canteen.

The joint dance of the London Students' Section of the I.E.E., the Students' Section of the Institution of Civil Engineers and the Graduate Section of the Institution of Mechanical Engineers was held on 16th January at Seymour Hall, W., and was attended by about 800 members and friends. The secretary of the I.E.E. was unable to attend but was represented by Mr. F. C. Harris, assistant secretary.

Following the Christmas party held by the Social Club of the Sloan Electrical Co., Ltd., and attended by the London staff, their wives, children and friends, the directors entertained the staff to a New Year party at the Palmerston Restaurant, Bishopsgate, London, E.C., on 15th January. Cabaret, dancing and games provided an enjoyable evening which was attended by the chairman of the company, Mr. F. C. Guildford, Messrs. N. Robertson, W. J. Bensley, and H. F. Guildford (directors) and ninety London staff members.

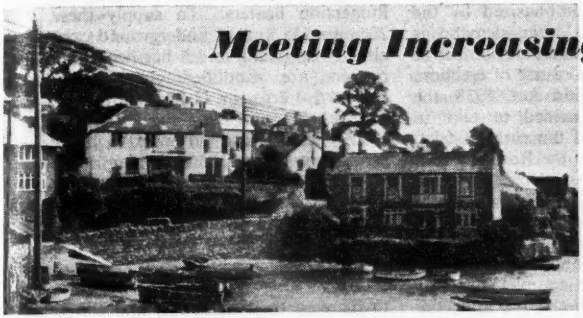
Obituary

Mr. C. L. Poyser.—We regret to report that Mr. C. L. Poyser, solicitor to the Central Electricity Board, died suddenly last Tuesday morning. Mr. Poyser joined the Board as assistant solicitor soon after its inception, in 1927. He became deputy solicitor in 1939 and solicitor in 1944.

Lady Couzens.—The death occurred on 18th January at Sidmouth of Lady Couzens, wife of the late Sir Henry Herbert Couzens, formerly chief electrical engineer at West Ham and Hampstead and later president of the Brazilian Traction, Light & Power Co.

Meeting Increasing Demand

Achievements of the Plympton St. Mary Undertaking



Plympton R.D.C. serves 22 miles (35 km) of sea coast which is becoming increasingly popular as a holiday resort. Here is a corner of Newton Ferrers

FOR increased supply of electricity resulting from the war, and for the scope of the extension programme now in hand to meet the demands of development schemes in course of construction, the record of the Plympton St. Mary Rural District Council electricity undertaking is somewhat exceptional. In the year 1938-39 sales of electricity by the Council were under 3 million kWh. During the war years consumption grew to 12 million kWh, and now it is at the rate of 17·5 million kWh per annum. With a network quite inadequate to meet this rapidly increasing demand, the undertaking is now embarking on an ambitious reinforcement scheme to be carried out in stages, involving an expenditure of approximately £350,000. This should not only greatly improve supplies to existing consumers, but should enable the benefits of electricity to be taken to those few isolated premises which are still not yet served. To date, the Electricity Commissioners have sanctioned loans amounting to nearly £157,000 to cover the estimated cost of the first sections of the scheme.

The history of this exceptional progress is one of unusual interest and several diverse factors have contributed to it. Plympton St. Mary has promoted successfully three or four special Acts of Parliament, whereby it has not only become statutory water and harbour undertakers, but has been given very special powers for the administration of its district. In addition, housing, sewerage and sewage disposal schemes have been and are being carried out, while cemeteries, parks and recreation grounds, modern refuse disposal, mortuaries, public buildings and other similar services have also been established. In 1926, the Council obtained a Special Order for the supply of electricity throughout its district, an area of 115 sq. miles (298 km²). The powers of this Order were augmented by the special Acts referred to, and in 1939 a further Order was obtained to extend the supply to the former Ivybridge urban district, which was transferred to the rural district under the county review.

When the electricity undertaking was inaugurated in August, 1928, prospects of any spectacular development must have appeared, to say the least, rather remote. The population of the whole area was about 25,000 (present population within the statutory area of supply is approximately 45,000) a large proportion of the area being moorland. It is not surprising, therefore, that in the first ten years of the undertaking's existence a somewhat conservative policy was adopted and development schemes were limited to those likely to be self-supporting. Nevertheless, by 1939, 136 miles of h.v. and l.v. mains had been provided to serve 6,300 consumers using 2¾ million kWh annually, and having a maximum demand of 2,300 kW.

Very soon after the outbreak of war there came an extraordinary increase in the demands of the Armed Forces, and this was followed by the greatly extended use of electricity for industry, agriculture and domestic purposes. The loss of much of the war load at the end of hostilities did not, as might have been expected, result in a reduction in the total sales of electricity. These have continued to rise until last year the figure was 17·5 million kWh, including 9·3 million kWh purchased under the all-in domestic tariff, 3·2 million kWh for lighting, cooking and heating, and 5 million kWh for power. Consumers now number over 12,000 and the highest maximum demand so far recorded is 6,628 kW.

The end of the war brought with it new demands which are only now becoming apparent. Apart from the general tendency

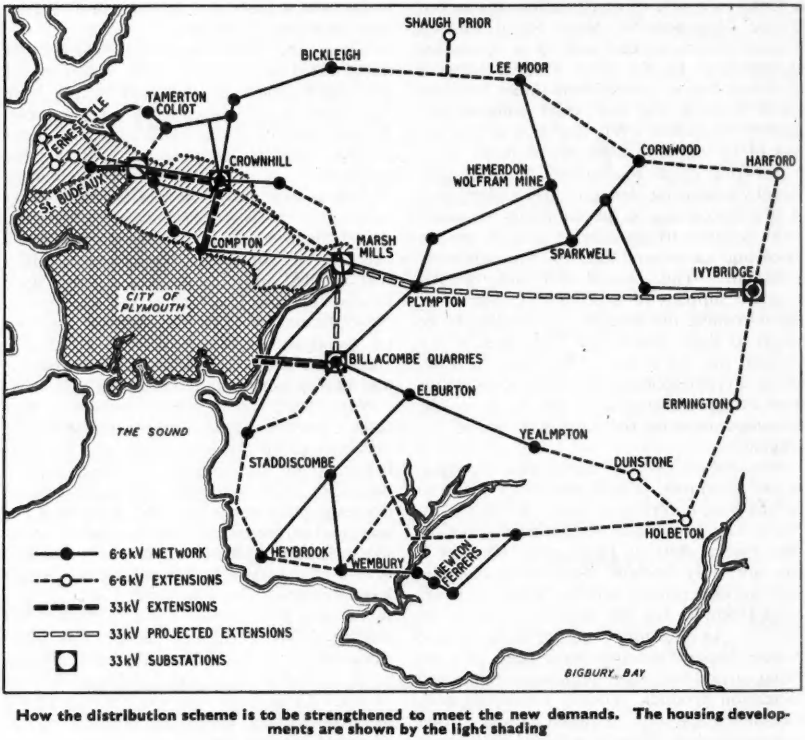
to use more electricity, emphasized by the shortage of solid fuel, a large demand is arising from the very considerable number of new houses erected and in course of erection. By the Plymouth Extension Act, 1938, the city boundaries were extended to take in three northern parishes of the rural district, but Parliament reserved to the Rural District Council the right to supply electricity to the transferred parishes.

The re-housing schemes, necessitated by extensive war damage, are largely centred in the transferred parishes, and no fewer than 1,633 dwellings have been completed, nearly one-third of which are all-electric, and constructional works are in progress for a further 2,700. In the conventional type of house, the tenants are given the option of gas or electricity. Each of the temporary dwellings adds a maximum demand of about 3 kW in the case of the all-electric type, and 1 kW in the case of the gas-electric type with immersion heaters. To supply these, over 22 miles (35 km) of underground cable have already been laid, and it has been found that matters are simplified considerably if a standard 0·2 sq. in. (1·29 cm²) cable is used for both h.v. and l.v.

The R.D.C. also proposes to build 1,729 permanent houses, mainly for agricultural workers, and about 100 have so far been finished. Altogether, up to the present, the Council has approved supplies to 4,444 new houses at a cost of £143,365.

Apart from these new domestic consumers, existing users have shown a strong tendency to increase their demands, and the growing popularity of the coastal townships and villages as holiday resorts has resulted in an added strain on the system.

There are big demands too for electricity for further rural electrification and a total expenditure of £41,476 has been approved to provide supplies to the five small villages



How the distribution scheme is to be strengthened to meet the new demands. The housing developments are shown by the light shading

remaining to be supplied, as well as a number of isolated farms. In some instances the necessary materials are already available, so that it is now only a question of labour before the full scheme is completed. Farmers are specially anxious to have electric sterilizers installed, though they have not yet realized the full advantage of milking machines.

A further substantial load, probably amounting to 12 MW, within the next five years is to be expected from the new industries which are being established in the area of supply, particularly in two new factory sites at Ernesettle, St. Budeaux, and Marsh Mills. The industries to be served include radio, lubrication equipment, quarries, stone crushing, timber, flock, printing, furniture, biscuits and prams. Yet another different class of growing load is to be found at the Royal Naval Engineering College which is to take a large block of power.

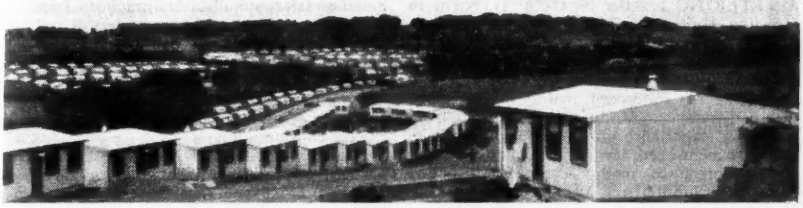
Even with the present restriction to 50 per cent of pre-war consumption, street lighting is beginning to become quite an appreciable load. The R.D.C. has 900 lamps of its own, and in addition supplies are given to the lamps on the housing estates which are the property of the Plymouth Corporation.

Demand for electricity has been further stimulated by the lowness of the charges. As an alternative to the flat rates for lighting (4d. per kWh), heating (1½d.) and power (2d.) there is a two-part tariff, embodying a low fixed charge based on floor area, plus ½d. per kWh. Occupiers of the temporary dwellings pay a fixed charge of 10d. a week plus ½d. per kWh. Large power users are charged £5 per kW of maximum demand, plus a kWh charge of ½d.-¾d. according to consumption, subject to a coal clause. Hire and hire-purchase of domestic appliances have been recently re-introduced for the benefit of consumers, but due to the large demands and the restricted supplies available, these have been limited temporarily to new dwellings. There are, at present, installed about 2,000 cookers, 450 wash-boilers, and 3,750 water heaters.

With demand having increased sixfold since 1938, and with prospects of its doubling again in the next three years, the network which is virtually unchanged from the original scheme is quite inadequate for its purpose. Accordingly, Mr. R. H. Upton, who was appointed electrical engineer to the R.D.C. just over a year ago, has put in hand a comprehensive 33-kV reinforcement scheme covering anticipated load requirements. At the suggestion of the Electricity Commissioners this scheme has been so designed that it will ultimately form a comprehensive system with neighbouring undertakings. The existing 6·6-kV distribution system is being reinforced at its present and probable future load centres by means of 6½ miles (10·46 km) of 33-kV cable with an ultimate radial feeder across the whole area to Ivybridge.

To complete the rural electrification, 18 miles (29 km) of 6·6-kV lines are being constructed round the fringes of the area to link up with the existing radial feeders. For isolated farms and hamlets, the e.h.v. single-phase system of distribution, which has proved so satisfactory in the Dumfries scheme, is being adopted.

Apart from the use of 0·2 sq. in (1·29 cm²) cable for both h.v. and l.v. extensions, work is also being considerably simplified by the adoption of a standard substation of neat design with four compartments accommodating the duplicate transformers, h.v. and l.v. switchboards. Full protective arrangements are incorporated in the substations with balanced voltage for the underground feeders and busbar protection on the switchgear. Overload and earth leakage



Emergency houses erected by the Plymouth Corporation are being connected at the rate of 25 a day. Here, on Brake Farm West Estate, are some of the 1,329 that are being provided in the Plympton area. Many of these are all-electric

relays are used for back-up protection. On the overhead lines overcurrent and earth fault relays are employed which discriminate with the distribution transformer h.v. liquid fuses.

In carrying out the work in connection with the Plymouth re-housing scheme, Mr. Upton has had the wholehearted co-operation of Mr. H. Midgley, the Plymouth city electrical engineer, and matters have been greatly facilitated by the establishment of a Services Co-ordinating Committee. Meeting weekly, this Committee, which includes representatives from the Plymouth City Electricity, Gas, Water, Engineers' and Architects' Departments, Plympton Electricity Department, G.P.O. Telephones, Ministry of Works and the local Radio Rediffusion Service, is of the utmost value in fixing substation sites and in securing an orderly procedure in carrying out trench work.

Grid Metering

Exacting Requirements Fulfilled

METERING practice on the grid system in the United Kingdom is reviewed in a paper prepared by MR. F. BYRNE (Central Electricity Board) for the Measurements Section of the Institution of Electrical Engineers.

The paper is concerned, mainly in retrospect, with performance. Modifications resulting from operating experience during the past fifteen years are mentioned, testing principles explained and maintenance methods outlined. The Electricity (Supply) Act, 1926, created the need for new and complex systems of power metering not previously developed in Great Britain and the way in which manufacturers satisfied the exacting requirements of the C.E.B. stimulated the urge for better metering in general.

The author states that equipment of all types has achieved its purpose with credit and that experience has vindicated the decisions of those who formulated the principles of grid metering. The equipment was commissioned in 1928 and now ranges in size from a single meter with maximum demand indicator to an outfit consisting of 104 impulsing meters, 15 summators and six printometers. Installations now number 363, including 179 equipments employing electrical summation. The number of meters is 5,148, including 1,123 VArh meters and 4,554 impulsing meters. There are 863 summators and 885 demand recorders, including 112 graphers and 44 printo-graphers.

The author has little adverse comment to make on meters; their accuracy has been of the highest practical grade. Grid metering differs from other forms mainly in respect of the wide employment of automatic summation and demand recording. The various systems used are examined critically, indicating that it is this branch of the subject which offers most scope for development.

Despite early misgivings, demand recorders have functioned with relatively little trouble and their importance has grown beyond the extent originally envisaged.

The author has not found it easy to forecast future trends, because so much will depend on commercial requirements. He thinks it is probable that mechanical summation will be gradually superseded by lighter equipment based on telecommunication practice. Improvement in contact impulsing renders it unlikely that electronic methods will be applied for this purpose because of their added complication. Accessibility for maintenance needs more attention and designs which facilitate the extension of units, especially summators, should receive consideration.

If maximum demand indicators continue to be used for tariff purposes, particularly where meters provide the motive power, then their performance will need to be improved. There is no standard specification for this class of measuring device, on which such large sums of money depend. As an alternative to frequency controlled clocks, it is possible that timing devices will be regulated by a central master chronometer, not so much to improve time-keeping as to secure synchronization of the integration period.

The reading of automatic recording meters needs further consideration. The printometer demand recorder might be adapted to print the number of kWh and maximum kW at the end of each month. That facility would not avoid the nuisance of meter reading, which would be necessary for checking performance, but it would enable the requisite information to be obtained more quickly.

Steel for Welding

CERTAIN characteristics of steels which are important in respect of suitability for welding, particularly for ship construction, were the subject of a lecture this week by MR. W. BARR (Colvilles, Ltd., Motherwell) to the Belfast Association of Engineers.

The author first dealt with the hardening of the parent plate adjacent to the weld deposit and the effect of the electrode gauge on the cracking of high tensile steel. He then outlined the properties of various alloy steels now obtainable from the firm with which he is associated. After mentioning some aspects of the welding of armour plate, the lecturer discussed " brittle fracture," a phenomenon which became prominent during the war due to the failure of several American welded ships.

COMMERCE and INDUSTRY

B.E.A. Headquarters. Overseas Market Research.

THE British Electricity Authority announces that the address of its headquarters as from 1st February will be British Electricity House, Great Portland Street, London, W.1 (telephone: Museum 6844; telegraphic address: Beeyay, Wesdo, London).

Lochaber Employees' Wages

Under an Industrial Court ruling the Lochaber Power Co. is not obliged to observe rates of wages and conditions of employment in respect of 22 of its power station operatives as agreed by the Joint Industrial Council for the Electricity Supply Industry. The Electrical Trades Union had contended that the operatives were employed in the electricity supply industry and should therefore have their wages and conditions regulated by agreements within that industry. Against the claim it was stated that the Lochaber Power Co.'s business was wholly or mainly to supply electricity for consumption by the company itself or by the North British Aluminium Co., of which it was a subsidiary. It was contended also that in their totality, wages and conditions of power-house employees were not less favourable than those of the industry.

B.B.C. to Use Banstead Mansion

Consenting to the use of Kingswood Warren, a local mansion, by the B.B.C. as an engineering research station, the Banstead (Surrey) Urban District Council has imposed a condition that no masts exceeding 150 ft in height shall be erected, and that no power plant shall be installed.

Radio Ambulances for West Riding

The experiment is to be carried out in the West Riding of introducing radio control between depots and ambulances on the road. Apparatus will first be installed in two West Riding County Ambulance depots and nine vehicles, and the new scheme should be in operation within a few weeks. The estimated cost of the experiment is £1,700. The selected depots will be fitted with a compact transmitter and receiver which can be operated simply by a telephonist. With a small receiver-transmitter in the ambulance it will be possible to maintain radio control over a radius of 10 to 15 miles (16 to 24 km).

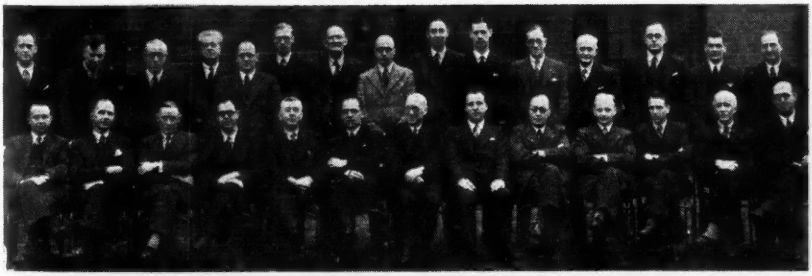
Textile Loom Motors

When changing over from wartime to peacetime production, the small-motors section of the Witton works of the General Electric Co., Ltd., in which ships' and engine room fans had been made, was reorganized for the manufacture of loom motors for the textile industry on a quantity basis. Almost the whole of the equipment is of new design, yet the shops were in production within three months of the changeover.

The standard range of three-phase loom motors is an important item among G.E.C. exports. They are specially designed machines, totally enclosed and of high torque, with outputs of 0·5, 0·75, 1, 1·25, 1·5, 2 and 3 h.p. at 220/230 and 380/400 V. The five smaller sizes are all of the same centre height, shaft diameter and fixing dimensions, while the two largest sizes are similarly interchangeable with one another, which is one of the features of the design of these motors.

S.W. & S. Conference

The accompanying photograph was taken at a recent conference of divisional and district managers of the Shropshire, Worcestershire & Staffordshire Electric Power Co. to discuss the progress to date of the staff training scheme. This scheme has been in operation sufficiently long to enable the managers to ascertain the reaction of their staffs, and to get some measure

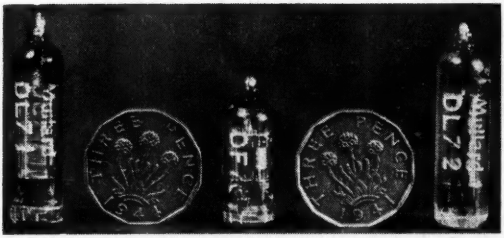


Divisional and district managers of the Shropshire, Worcestershire & Staffordshire Electric Power Co. at a recent conference

of its value. The divisional and district managers also discussed the points raised and suggestions made by employees during the period of their training.

Hearing-Aid Valve Contract

The Government has placed an order with the Mullard Wireless Service Co., Ltd., for 400,000 valves for use in the state-sponsored hearing-aid, known as "Medresco," to be made available to all persons suffering from defective hearing, when the National Health Service Act comes into operation on 7th July, 1948. It is stated that 400,000 units are to be produced,



Mullard sub-miniature valves for the "Medresco" hearing aid compared with threepenny pieces

together with 100,000 annual replacements, and that the whole scheme will cost £5,000,000 a year.

The "Medresco" unit is a wedge-shaped instrument, 2½ in. (6·35 cm) wide at the top and 1½ in. (3·81 cm) wide at the bottom. The overall length is 3¾ in. (9·52 cm) and it is 1 in. (2·54 cm) thick. In this confined space is housed an amplifier using two of the new sub-miniature voltage amplifying pentodes DF70 and either a DL71 or DL72 output pentode. These valves are 10 mm (0·4 in.) in diameter, the lengths being 30 mm (1·16 in.) for the DF70, and 38 mm (1·5 in.) for the other two.

Industrial Instrument Manufacture

Presiding at the annual general meeting recently in London of the British Industrial Measuring & Control Apparatus Manufacturers' Association, Mr. W. G. Ardley, of George Kent, Ltd. (who was re-elected chairman for the third year in succession) said that 1947 had been a satisfactory year. The Association represented, with two or three exceptions, the principal industrial measuring and control apparatus manufacturers in the country and was the focal point of contact with the industry. The status of the Association was higher now than it had ever been, and its contacts with various Government Departments, as well as with the British Iron & Steel Research Association, the British Standards Institution and the principal user industries, had been strengthened. The importance of industrial instrumentation and the vital part it had to play in the industrial recovery of the country was now fully recognized on all sides. To speed industrial recovery, steps had to be taken to reduce waste and to economize in material, and in these respects, including the speeding up of production generally, the industrial instrument industry had a great contribution to make. The extended use and application of measuring and controlling equipment in industry could do much to ensure maximum efficiency in industrial processes. Mr. H. W. Blake, of Tylors of London, Ltd., was elected deputy-chairman.

At the lunch which preceded the annual meeting the principal guests were Lt. Gen. F. G. Wrisberg, of the Ministry of Supply, Sir Charles Ellis, president of B.C.U.R.A., Sir Charles Goodeve, Director of the British Iron & Steel Research Association, and Mr. A. J. Philpot, Director of the British Scientific Instrument Research Association and the Scientific Instrument Manufacturers' Association.

R.A.F. Bulletin

The Royal Air Force has formed an Electrical Officers' Association with Group Captain C. C. Bazell, A.M.I.E.E., head of the Electrical Branch of the R.A.F. as its first president. The Association has now published the first number of its Quarterly Bulletin, which in addition to Association news contains articles on electric vehicles by Sqn. Ldr. R. C. Hawkins and the magnetron by Sqn. Ldr. W. G. Shannon.

"Betro" Activities

Lt. Col. H. A. P. Disney, Director of the British Export Trade Research Organization, announces that next month "Betro" starts its third year of full activity with work on hand showing an increase of approximately 300 per cent over the volume of work on hand nine months ago. More manufacturers and business associations are supporting "Betro," while the financial assistance offered by the Government, on which "Betro" can call during the period 1947-1952, assures a sound background for still further development. With the announcement of import restrictions in many overseas markets, and the complete closing down of some markets, manufacturers began to recognize more fully the necessity of market research, and the subsequent publication of the results of the Geneva Tariff Conference has brought in further requests for information about the changed conditions under which British goods could in future be exported.

Plans are well advanced for a substantial expansion of the overseas trade intelligence service of commercial news and the opening of an office in Washington, accompanied by wide publicity and co-operation throughout the United States, has rendered valuable service to both

British sellers and American buyers. Important buyers visiting the United Kingdom have been placed in direct touch with British suppliers. "Betro's" other offices abroad have been kept busy, and with the exception of the U.S.S.R. and two Balkan States, every country in Europe has been visited by research executives on behalf of manufacturing interests. Extensive work has been carried on in the West Indies, S. America, S. Africa and Australasia. A "Betro" executive is now operating in Spain and Portugal and in the immediate future another leaves for Canada to supervise market research.

Silver Jubilee

E. & E. Kaye, Ltd., non-ferrous metal manufacturers, Ponders End, Enfield, recently celebrated their silver jubilee. Production began in December, 1922, in a small factory for the drawing of high-conductivity copper wire only. Since then large modern factories have been erected producing copper wire and strip, covered wires, aluminium and light alloy extrusions and tubes and magnesium powder. At a function to celebrate the anniversary which was attended by most of the company's employees, Mr. Bourquelot, director, said he was sure that expansion in the future would be even more rapid. Mrs. Bourquelot made presentations to employees having twenty or more years service, and the management and guests then went to London in a fleet of motor coaches to a theatre show.

Industrial Electronics Exhibition

Some of the latest developments in industrial electronic equipment are shown in an exhibition being held by Cinema Television, Ltd., which opened on Monday last at Brettenham House, Lancaster Place, Strand, W.C.2. This exhibition will remain open until 30th January and as the number of tickets is limited application should be made to the company at Worsley Bridge Road, Lower Sydenham, S.E.26.

Several electronic counters are shown and demonstrated, as are two types of process timer and various metal detectors. Other exhibits include a demonstration oscilloscope suitable for lecture work and a universal oscilloscope, built on the unit system, which is capable of displaying five traces simultaneously on the face of a 6 in. cathode ray tube.

Alleged American "Price Ring"

Conspiracy in price fixing manipulations alleged to have cost public utilities on the Pacific coast millions of dollars was charged against ten prominent electrical manufacturing companies in indictments returned by a federal grand jury at Los Angeles on 13th January, says *Reuter*. Mr. James McGrath, special attorney for the Anti-Trust Division of the Federal Attorney's Office, announced also that civil suits have been filed demanding an injunction to enforce the discontinuance of the alleged practices. The companies named in the indictments and civil suits were the American General Electric, the Westinghouse Electric Co., Delta Star Electric Co., A.B. Chance Co., Cole Electric Co., Hi-Voltage Equipment Co., Pacific Electric Manufacturing Co., Railway and Industrial Engineering Co., Southern States Equipment Corporation, and Electric Engineering Co. The indictments charged the defendants with having exchanged information and price catalogues and entered into other agreements which eliminated competitive tendering in sales of electrical equipment to publicly and privately owned utilities. The practice was alleged to have begun in January, 1935, and to be still in existence.

Aluminium Surface-finishing

To the series of information bulletins issued by the Aluminium Development Association there has been added No. 13, which deals with the surface finishing of aluminium and its alloys. Cleaning and degreasing are first explained, then follow mechanical treatment, chemical processing, electro-plating and paint finishing. Electro-plating is dealt with at some length, including pre-treatment, plating solutions and conditions to be observed. There is also a selected bibliography and lists of relevant official specifications.

German and Japanese Industry

The latest reports on German and Japanese industry obtainable from H.M. Stationery Office include B.I.O.S. 1349, "Design and Working Details of the German Demag Electric Hoist Block" (2s.) and B.I.O.S. 1474, "Developments in Cable Manufacture (Use of Tungsten Carbide Dies)" (1s. 6d.).

"Flight" Air-mail Subscription

Iliffe's announce that, under a special air mail subscription now in operation, *Flight* can be in the hands of readers in the United States and Canada within twenty-four hours of publication. Commencing with the issue of 22nd January, this new air-mail distribution plan brings up-to-date news of British aviation to buyers in the hard-currency areas. The special subscription rate for Canada and U.S.A. is £4 ($16) for six months and subscriptions may be remitted to British Publications Inc., 150, East 35th Street, New York 16, N.Y.

Cable Jointer's Death

A verdict of "Accidental Death" was returned at an inquest held at West Ham on 12th January on E. Herrington, who was employed as a cable jointer by the West Ham Corporation Electricity Department. Evidence was given that during civil engineering work a sheet steel pile struck a 6,000 V, 4-core, steel-tape-armoured cable and damaged it. The mains records indicated that the cable was "dead" and Herrington was instructed to cut and seal

the ends in preparation for a diversion. He had already removed the armour and the lead sheath and had bared one of the two neutral cores when a short circuit occurred and he received burns which proved fatal. It was pointed out on behalf of the Corporation that this was the first electrical fatality in the forty-seven years of the Electricity Department's existence.

Pottery Drying

Pemlec, Ltd., informs us that it was responsible for the design and execution of the electrode boiler installation at Leighton Potteries described in our issue of 26th December.

Trade Announcements

Lionel Robinson & Co., Ltd., have removed their Portsmouth branch to 65, Marmion Road, Southsea, Portsmouth.

W. G. Walker & Co. (Engineers), Ltd., have opened new branch works at 1, Stanford Street, London, S.W.1.

Newey & Eyre, Ltd., electrical wholesalers, opened a further branch on 12th January at 9, Brook Street, Peterborough.

The Record Electrical Co., Ltd., has removed its Glasgow office to 162, Buchanan Street, Glasgow, C.1 (telephone: Douglas 4205). The office is in charge of Mr. R. H. Dean.

The Department of Development and Research of **Tube Investments, Ltd.,** has removed to Plume Street, Aston, Birmingham.

Clang, Ltd., has appointed Mr. H. J. Coleman as its representative in Yorkshire, Lincoln, Nottingham, Derby, Stafford, Warwick, Northamptonshire and Leicester. His address is 434, Stonegate Road, Leeds, 7.

The Sloan Electrical Co., Ltd., is now occupying its new Manchester premises at 28/32, Queen Street (goods entrance and trade counter 31/33, Lloyd Street) (telephone: Deansgate 5851/2).

Neepsend Power Station

The list of contractors given in our issue of 16th January for the 50,000-kW extension at Neepsend power station, Sheffield, should have included the name of Hopkinsons, Ltd. We are informed that this company supplied the bulk of the boiler mountings and h.p. valves.

Trade Publications

Tudor Accumulator Co., Ltd., 50, Grosvenor Gardens, London, S.W.1.—Two leaflets on the floating battery system of emergency lighting and accumulator replating data.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—Priced catalogue of projector lamps.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—Monthly stock list of motor starters and accessories.

Telegraph Construction and Maintenance Co., Ltd., 22, Old Broad Street, London, E.C.2.—Technical brochure on "Telcon" thermostatic bimetals.

Nuclear Physics Research

THE group of manufacturing and associated concerns which now constitute the English Electric Co., Ltd., has not lacked research facilities. Different sections of the several works have their own investigational departments to deal with problems peculiar to their specialized products. More recently their work has been conducted co-operatively with the main Nelson Laboratories at the company's Stafford works.

Some idea of the extent and scope of the latter has already been indicated (*Electrical Review*, 14th November, 1947) with a brief reference to the activities of the newest group of laboratories concerned with nuclear physics. This section is about three miles away from the Stafford works, being accommodated in a former aero-engine factory which was conveniently adaptable to the production and study of the characteristics of apparatus for Government and University centres concerned with atomic physics research. Some of the equipment inspected during a tour of the laboratories last week, though perhaps not new in principle, represents considerable advances in design and construction which have permitted striking reductions in overall dimensions to be effected.

Flash Discharge Tubes

A PAPER on modern flash discharge tubes and their applications prepared by MR. C. R. BICKNELL was read in London last week at a meeting of the Illuminating Engineering Society.

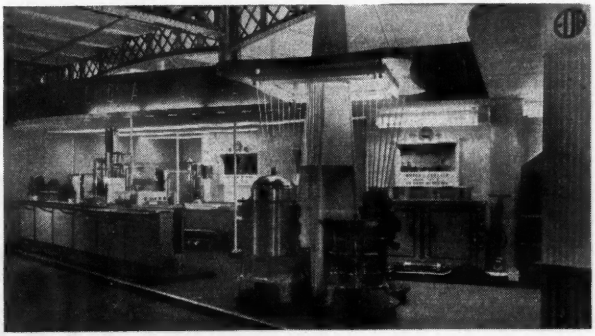
A range of seven tubes was described with flash durations ranging from one to approximately 1,500 micro-seconds and suitable for single flash loading of 56 to 16,000 joules. Some of these tubes are suitable for press and studio photography, the light source in high definition stroboscopes, the photography of of cloud chamber ion tracks and other applications where it is desirable to examine or photograph objects moving at high speeds. The necessary high current density of the discharge in the tube which produces a high intensity flash for very brief duration is obtained by discharging through it a condenser which has been charged to a comparatively high voltage (10,000-15,000 V).

With the exception of one filled with an argon-nitrogen mixture, all the tubes described are filled with xenon gas which, at the high excitation levels reached, produces a light approximating closely to that of natural sunlight. It was important, the author stated, to note that an object being photographed could be illuminated to a high intensity without being subjected to radiant heat, and that there was no necessity for a pose to be held whilst the flash duration was too short for the iris of the eye to react to the change in level of illumination.

Catering Exhibition

Growing Interest in Frosted Food Equipment

THE most striking feature of the Hotel, Restaurant and Catering Exhibition which concludes to-morrow, Saturday, at Olympia, London, is the prominence given to frosted food equipment, which enables fruit, vegetables and even cooked dishes to be kept almost indefinitely and made available at any time of the year, in or out of season, in prime condition. Apart from individual displays there are two special exhibits. In one W. Brooks & Son (with the aid of storage and display cabinets by J. & E. Hall, Ltd., Hussmann British Refrigeration, Ltd., and W. Bruce, Ltd.) show the immense possibilities of these new facilities by means of quick frosted food assembled from all parts of the world. The other special exhibit takes the form of a restaurant in which J. Lyons & Co., Ltd., serve "Frood" foodstuff which has been cooked first and then kept frozen until required. As we indicated in our article on 30th May last on the Cadby Hall freezing plant where the preparation is undertaken, "Frood" will have very much wider scope when rationing difficulties are a thing of the past.



The E.D.A.-E.L.M.A. stand

Facing visitors as they enter the exhibition is a prominent display arranged jointly by the British Electrical Development Association and the Electric Lamp Manufacturers' Association, comprising a fully-equipped cafeteria service counter together with a full range of heavy-duty equipment, including ranges, steamers, fish fryer, hot-cupboards, vegetable boilers, tea and coffee making apparatus, potato peelers, small appliances and lamps. A novelty is a small-scale model which greatly simplifies kitchen planning. A complete set of kitchen components, made to scale, all strongly magnetized, can readily be attached to each other or the base of the model, and any type of kitchen can be arranged in a few moments complete with doors, windows, service hatches and all electrical appliances placed in the most convenient positions.

Another E.D.A. contribution to modern kitchen planning takes the form of a twelve-page booklet, compiled by Mr. A. L. Osborne, F.R.I.B.A., entitled "Electric Kitchen Design for Small Houses," setting out, for the benefit of architects and planners, the core of a consistent universal plan for the average semi-detached home of the future, whether the floor-space be the minimum of 850 sq ft, or the more generous allowance of 1,000 sq ft, ensuring right standards in equipment. By a clever alternative arrangement, the weakness of the "left-handed" kitchen is overcome.

Also facilitating kitchen planning is a new range of G.E.C. heavy-duty electric cooking equipment employing unit-type construction and embodying the latest principles of heat application and control. All branches of the hotel and catering industry are provided for, from the smallest snack bar to the largest hotel. Large ranges and boiling tables can be supplied with various hob layouts. For roasting only, there are different sized general-purpose ovens or a cabinet roaster, while boiling tables can be butted on to roasting ovens. Bains marie, fish fryers and steaming ovens are also included in the new equipment, in addition to vegetable and water boilers, stockpots and grillers. Coffee percolators can be supplied in capacities of up to 7 gal. (31·8 litres). The G.E.C. is exhibiting "Osram" lamps, lighting fittings, luminous call systems, public address equipment, slot-meter fires, switches, fans, vacuum cleaners, floor polishers and clocks.

A representative display by the Simplex Electric Co., Ltd., includes a "Creda" double-oven range, steaming oven, chef and restaurant ranges, griller, pedestal hand dryer, kettles, the "Brentwood" convector and several fires. Boiling pans, tea coffee and milk preparing equipment, milk and soup warmers and hot-cupboards are products of James Stott & Co., (Engineers), Ltd. Gardiner & Gulland cafeteria equipment includes stainless steel counters, "Cookserve" multiple units and the "Wickman" electrically heated food conveyors.

A double-unit chef's range is the central exhibit of the Jackson Electric Stove Co., Ltd., which also shows thermostatically controlled pastry ovens, hot-cupboards, fish fryers, and a twin boiling plate unit, electric trolley, etc. Benham & Sons, Ltd., show various types of electric ovens, while among L. G. Hawkins & Co.'s display are the "Electric Hostess," fires, lamps, kettles and fans.

Refrigeration equipment, including cold rooms, drinking water coolers, ice-cream makers and storers, frosted food cabinets, etc., is to be seen on the stands of the Lightfoot Refrigeration Co., Ltd., Pressed Steel Co., Ltd., Kelvinator, Ltd., Frigidaire, Ltd. (including a new 4½-cu ft household cabinet), Marco Refrigerators, Ltd., Anglo-French Distributors, Ltd., Igloo Speed Freezers, Ltd., and David Kind, Ltd.

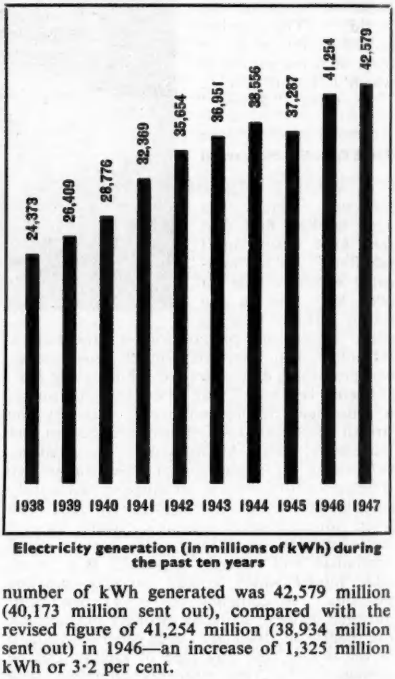
Food preparation machinery such as dish-washers, mixers, mincers, dough kneaders, potato peelers, meat choppers, sausage-filling machines, coffee mills, vegetable slicers, shredders, and graters are specialities of the Hobart Manufacturing Co., Ltd., the Peerless Electrical Manufacturing Co., Ltd., Fairfax Engineering, Ltd., Swallow Engineering Co., Crypto, Ltd., the Precision Sales Organization, and Avamore Engineering Co., Ltd. A new electrically heated trolley and the new "Wellington" chopper accompany the Euk dishwasher and toasters shown by Steel & Co., Ltd.

Other exhibits of electrical interest are to be found on the stands of W. M. Still & Sons (conveyor type dishwasher and potato peeler), the Silent Machine Co. (cutters, mixers and sausage fillers), Metcalfe & Co., Ltd. ("Champion" potato peeler, gravity slicer, shredder and dicer, and knife grinder), Metcalfe Ideal Products, Ltd. (potato peelers and chippers), Hoover, Ltd. (vacuum cleaners and fractional h.p. motors), Rowe Bros. & Co., Ltd. (peelers, heated trolley, lighting fittings and convectors), Charles W. Green (waffle cooker), Minimax, Ltd. (automatic tea and coffee making equipment), Small Power Machine Co., Ltd. ("Wiz-mix" mixer and "Crispa" potato cutter), Mabbott & Co., Ltd. (heated trolley), Dawson Bros., Ltd. (dishwashers), G. F. E. Bartlett & Son (Metal Workers), Ltd. (service trolleys, snack-bar counters), Frank V. Magrini (food storage conveyors, hot-cupboards and coffee makers), Goldsmiths & Silversmiths Co., Ltd. (clocks), British Vacuum Cleaner & Engineering Co., Ltd. and its subsidiary the Magneta Time Co. (clocks, radio sets, "Loud-speakerphones" and cleaners), Staines Kitchen Equipment Co., Ltd. (commercial toaster), Crittall Kitchen Equipment Co., Ltd. ("Magic Turmix" emulsifier and homogenizer), L. & J. Thomas (Engineers), Ltd. ("Merlin" whisk), Shepherd's Aerosols, Ltd. ("Aerovap" volatilizer for killing flies, etc.), Anglo-Baltic Produce Co., Ltd. ("An-Ba" cleaners and "Domesticold" refrigerator), John Mollett, Ltd. (hot-cupboards), L. E. Pritchett & Co., Ltd. (emulsifiers), Dictograph Telephones, Ltd. (sound distribution equipment), Central Rediffusion Services (radio equipment), Automatic Telephone & Electric Co., Ltd. (sound equipment), Vactric, Ltd. (cleaners and floor polishers), Canteen & Café Products, Ltd. (bain marie and mixer).

Generation of Electricity in 1947

RETURNS rendered to the Electricity Commissioners show that 4,432 million kWh was generated (4,190 million kWh sent out) by authorized undertakings in Great Britain last month, compared with 4,372 million kWh (4,140 million kWh sent out) in December, 1946—an increase of 1·4 per cent.

During the twelve months of 1947, the total number of kWh generated was 42,579 million (40,173 million sent out), compared with the revised figure of 41,254 million (38,934 million sent out) in 1946—an increase of 1,325 million kWh or 3·2 per cent.



Electricity generation (in millions of kWh) during the past ten years

Diesel-electric Train's Test Run

DURING a run from Derby to St. Pancras last week the recently completed diesel-electric locomotive, drawing a 12-coach train weighing 390 tons, attained a speed of 81 miles per hour (130 km.p.h.) and arrived six minutes ahead of schedule.

ELECTRICITY SUPPLY

Street Lighting Improvements. New Stourport "B" Station

Banbury.—New Street Lighting Installation.—The town was at one time threatened with a total absence of street lighting this winter. A contract was signed in 1946 with the Shropshire, Worcestershire & Staffordshire Electric Power Co. for the installation of electric street lighting, and at the same time the existing contract with the local gas company was cancelled, that company, however, agreeing to maintain such lighting as was necessary until the gas lamps were replaced by electric lighting. It was not realized, however, that the consent of the Minister of Transport should have been sought and negotiations were immediately opened. The time arrived, however, when the Gas Co. could not longer obtain the maintenance material for its system, having cancelled its own contracts with suppliers. The result was that before negotiations with the Minister had been completed the Gas Co. had to discontinue its lighting. About six weeks before Christmas the Minister gave his consent to the installation of electric lighting along certain group "A" roads, including the main shopping centre. Within a week of receiving consent, the first 25-ft (7·6 m.) street lighting column was being erected, and forty-seven of these columns were up and lighted in time for Christmas shopping. The speed with which this installation was accomplished was largely due to the special efforts of the General Electric Co., Ltd., the contractors for the scheme, in delivering and erecting the equipment.

Erecting the first electric lighting standard at Banbury

Barrow-in-Furness.—Use of Vickers Armstrongs Generating Plant.—The electrical engineer has reported that Vickers Armstrongs, Ltd., have been requested by the Ministry of Fuel and Power to allow the use of the surplus generating plant available at Cavendish Park with a view to relieving the loads on the grid at peak periods, and that in view of the urgency arrangements have been put into operation for the transmission of such a supply through the Corporation undertaking.

Bradford.—Distribution Extensions.—The Electricity Committee has approved a scheme for augmenting the supply of electricity in three districts, by the laying of 33-kV and 6·6-kV cables in Saint Street and Great Horton Road and the provision of additional high-voltage switchgear in the Saint Street transforming station at a total estimated cost of £15,314.

Blackpool.—Street Lighting Improvements.—A £100,000 scheme to modernize the street lighting has been approved in principle by the Corporation. Because of the present shortage of materials, it is unlikely, however, that the plan will get official approval for two or three years. The proposals include coloured concrete standards, etc. Fluorescent lighting of soft rose-pink colour is suggested and permanent decorative features will form centre-pieces for autumn illuminations. In the shopping area, standards are to be avoided as far as possible.

Boston.—Diesel Generator.—The Town Council is to invite tenders for the installation of a diesel alternator at Fordington at estimated cost of £6,500.

Burnley.—Extension.—The Corporation has approved a scheme for supplying electricity by means of e.h.v. overhead lines to the Roggerham and Rowley (£4,030) and the Habergham Eaves areas (£1,300) and by e.h.v. underground cable to the Fennymore Foot area (£900).

Cheltenham.—The 20,000th Consumer.—The 20,000th consumer was recently connected to the mains and the occasion was marked by the presentation by Councillor H. T. Bush, the Mayor of Cheltenham, of a toaster and an electric fire to the fortunate consumers, Mr. and Mrs. Curtis.

Hastings.—Supply for Printing Works.—The Corporation is to provide a three-phase supply to F. J. Parsons, Ltd., for additional printing machinery, at a cost of £4,660.

Stourport.—NEW POWER STATION.—The accompanying picture shows an architect's drawing of the Stourport "B" power station which has received notice at the Royal Academy and has been approved by the Royal Fine Art Commission. The consulting engineers for the station are Ewbank & Partners, acting for Edmundsons Electricity Corporation, Ltd., and its associated company, the Shropshire, Worcestershire & Staffordshire Electric Power Co., of which Mr. D. H. Kendon is the general manager. The architects are Messrs. F. Quentery Farmer and Frankland Dark, F/F.R.I.B.A.

Architect's drawing of the Stourport "B" power station

Swindon.—SUPPLY TO PUMPING STATION.—The Corporation proposes to enter into an agreement with the Wessex Electricity Company for a supply to a pumping station at Latton.

Wolverhampton.—ELECTRICITY CHARGES AND COAL COSTS.—The Town Council last week adopted a recommendation of the Electricity Committee that the reductions in charges which operated for the first three quarters of 1947-48 should be withdrawn for the fourth quarter so as to help to meet the higher cost of coal. It was estimated that about £42,000 of the £60,396 available to meet the reductions would have been applied up to the end of last December, and that the ascertained surplus for the current year, added to a balance in hand of £18,000, would be just about sufficient to cover the increased cost.

Foreign Electrical Engineering Practice

A REVIEW of electrical engineering practice in Europe was given in a paper by MR. C. W. MARSHALL (C.E.B.) which was read before the Association of Supervising Electrical Engineers in London this week. The countries chosen to illustrate the methods of supply, France, Germany, Denmark and Sweden, all use 50 cycle systems but different in detail because of the varying basic sources of energy.

Mr. Marshall compared British with foreign practice and said that although we have a well-earned reputation for solidity of construction it has been gained at the expense of power-to-weight ratio. With regard to overhead lines, spectacular developments have not been called for in this country owing to the short transmission distances. The most original pioneer work has been done by Germany who contributed the hollow conductor and the multiple conductor line.

In France, where transmission distances were of the order of 200 miles and main transmission at 220 kV, the lines were worked so close to the stability limit that the engineers were among the recognized experts on stability questions. The next stage of development would be 400 kV transmission lines. Sweden, which probably had the most economical lines in the world, was likely to be the first country to use 400 kV in practice.

It was mentioned that in Germany the high-voltage d.c. project had undergone considerable development and Marx rectifiers were in operation at 80 kV. Mercury arc equipments had proved so effective that an installation of 60 MW at 400 kV was about to be carried out when the country collapsed.

Britain, Mr. Marshall said, was unrivalled for metalclad switchgear up to voltages of 11 kV, but due to economic considerations was not so for higher voltages. On the Continent and particularly in Germany remarkable work had been done in producing switchgear with the minimum amount of metal. At 132 kV, air blast and small-oil-volume circuit breakers were approximately half the weight of ours and bus-bars, etc., were correspondingly light.

In the author's opinion an outstanding point in European switchgear practice was that the users would not tolerate oil in switchgear, which probably indicated that foreign oil switchgear had been less satisfactory in service than ours. There was, however, a need for us to observe Continental practice carefully if we were to retain our eminent place in world competition.

Switchgear Standardization

Suggested Establishment of Panels to Guide Industry

A PAPER on switchgear for alternating-current was read by MR. D. E. LAMBERT, B.Sc. (Eng.), M.I.E.E., and MR. J. CHRISTIE, M.I.E.E., both of A. Reyrolle & Co., Ltd., on 15th January before the Institution of Electrical Engineers in London. This paper was one of a series on standardization.

Many types and arrangements of switchgear available and a wide diversity of requirements were reviewed. The authors stated that at the present time the degree of standardization depended on voltage and application. Standardization of complete switchgear units for lower voltages appeared to be feasible, achieving a higher manufacturing efficiency. At higher voltages, however, the cost of development and testing plant in relation to the total demand appeared to warrant a measure of rationalization including communal testing facilities.

Due to the diverse requirements to be met and the progressive development of circuit breakers and associated components of switchgear, design and development was not as yet stable enough to allow an appreciable degree of standardization of construction. The design and construction of many switchgear components and auxiliary equipment was fairly well stabilized and should be standardized. The development of switchgear and in particular of circuit breakers and circuit breaker technique involved an almost continuous review of standard specifications, the incorporation of which in the many performance requirements lagged far behind development. It was suggested that the number of British Standard circuit breakers be reduced.

Closer Collaboration Necessary

To assist the standardization of switchgear generally it was desirable to have closer collaboration between users, consulting engineers and manufacturers. This could be facilitated by the formation of two panels. The first, a small technical "Provisional Standards Panel" to review technical progress and issue recommendations for the guidance of industry and provisional standards with a view to the ultimate formation of British Standards. The second, a "Design and Utilization Panel" to consider rationalization and standardization of switchgear and auxiliary equipment and arranging to put into practice the recommendations and standards of the Provisional Standards Panel.

The President (MR. PERCY GOOD, Director, B.S.I.) said that the diversity of user requirements represented a problem the solution of which was urgent in view of the present condition of the country. He believed that an objective study should be made of each branch of electrical engineering production with a view to seeing that the maximum benefits of rationalization and standardization were achieved.

MR. R. H. ABELL (C.E.B.) supported the idea of setting up panels of users, consulting engineers and manufacturers to issue recommendations for the guidance of the industry, but doubted whether they should be associated with the B.S.I. It would be better, he thought, to have six or eight panels working independently in districts where close operating experience could be obtained and later to co-ordinate their efforts. Unless considerable economies in cost could be obtained almost at once by standardization, he said, it would be difficult for engineers who used switchgear to agree to a reduction in the number of standard ratings, which would almost certainly involve them in additional cost.

Busbar Arrangements

Industry paid a heavy penalty for not being able to make up its mind about busbar arrangements. He thought that it would be better to concentrate on single and double busbars only. The ring busbar was a naive attempt to avoid busbar selection by simply leaving the other busbar out and involved complicated isolators in the busbar itself, which meant additional hazard. The need for on-load busbar selection arose so infrequently that it was questionable whether the switchgear industry should be faced with the enormous complications which it involved.

It might be desirable to limit the use of metalclad switchgear to 1,500 MVA and 33 kV, and beyond that rating revert to the older practice of using open-type switchgear in suitable cellular structures, which should materially assist standardization.

MR. H. E. COX (B.T.H.) suggested that the standardization of the switchgear itself was a long way off; there was not sufficient technical agreement for time to be profitably spent on it. On the other hand, standardization of detailed apparatus was a fruitful field of endeavour in which much work was already being done. The problem, however, was too large to be tackled as a whole; each component must be dealt with in series and in parallel until the whole field was surveyed. The time had come, at any rate with oil circuit breakers, when one could say "one voltage, one preferred breaking capacity rating." At each voltage it would be necessary to have two or three semi-standard ratings as well. What was wanted was the highest rating at any voltage which could be obtained without expensive construction.

MR. D. P. SAYERS (Birmingham) expressed the opinion that users' requirements in respect or ordinary substation switchgear could be completely standardized. There must also be,

he said, much closer integration of the factors affecting generation and transmission engineers at the central station, with regard to the design and layout of main station switchgear. With increase in rupturing capacity the cost per panel rose very rapidly, so it was essential that the transmission engineer should tack on to any particular switch a circuit capable of taking the maximum load rating of that switch. The cost of transmission at 11 kV was round about £400 per 1,000 yards of underground cable per MVA, but fell to little more than £100 at 132 kV, assuming that the maximum size of cable was used in each case.

Saving at Hams Hall

When considering the most economic method of getting the load away from a new generating station, it was clear that at 11 kV the cost at anything over 500 MVA was excessive. At 33 kV it was more reasonable, but became heavy at 1,000 MVA and where the short-circuit level was 1,500 MVA or more it was necessary to go to 66 or 132 kV. These figures demonstrated the great importance of matching the transmission factors with the station voltage and the application of those principles to the second half of the Hams Hall "B" station showed a saving of £500,000 in capital expenditure over ten years. He thought that British manufacturers should pool their research facilities and rationalize their manufacturing capacity, dividing, say, the whole range of switchgear into four groups and allocating each group to six firms. Moreover, manufacturers must provide some inducement to the customer to purchase standard articles.

MR. B. L. METCALF (Brush) thought that each industry should be dealt with by the panels which the authors recommended, and they should insist on some degree of dimensional standardization. Whether it was possible to rationalize the electrical manufacturing industry properly, in view of its present structure, was debatable, but the problem had to be studied from the purely manufacturing angle and much could be done by dividing up certain classes of breaker among certain manufacturers, while keeping a wide area open for experiment. That should be easier to carry out with centralization of purchases.

MR. C. J. O. GARRARD (G.E.C.) said that it must be borne in mind that this country had the biggest export market in switchgear in the world and had to cater for every variety of climate and type of service.

The time had come, however, to consider whether it was desirable to freeze development for a time and introduce a large measure of standardization. They must use every possible means of saving time and labour and of cheapening products by mass production, which presupposed rationalization. The improvement which could be obtained by further rationalization within a factory was only marginal; it was necessary to rationalize, not the factory, but the industry by dividing up the production between factories.

MR. H. LEYBURN (Reyrolle), to illustrate the difficulties of standardization, said that taking account of all the variables in respect both of MVA and of construction the total number of different panels which could be built was a little under a million, while simply taking account of practicability and economics it was between five and ten thousand. He agreed that the most fruitful field for standardization at present was that of components and auxiliary equipment.

MR. W. A. MCNEILL (Ferguson Pailin) pointed out that the problem was not purely a domestic one. We must export to live and so must bring costs down. While co-operation between manufacturers and users was very important, he disagreed with the idea of adding more panels to the network of committees already in existence. It was the will to standardize which was lacking. Rather than try to rationalize the industry it would be better to cut down the enormous number of current, MVA and voltage ratings to the minimum.

Importance of Export Requirements

MR. R. N. BUTTREY (Cooke & Ferguson) said that all manufacturers would agree on the need for standardization of requirements. He thought 6·6- and 11-kV ratings could be combined and short circuit rated clearances below 7 or 8 kA should be deleted. Export requirements, particularly in America, must be considered.

MR. J. P. A. MELDRUM (Metropolitan-Vickers) also emphasized the need for standardization to help in the coming struggle in the export market, but thought that proposals for dimensional standardization would merely lead to endless discussion. Something might be done, however, in the direction of standardization of application of switchgear to system network.

MR. K. H. TEWSON suggested that standardization must be judged by the extent to which it enabled manufacturers to reduce the price of standard sizes of equipment. To limit too severely the range of sizes might be to waste materials and put up costs. In certain ranges the authors suggested cutting out single busbar switchgear. Could they by so doing reduce the cost of double busbar to the present cost of single, or had the user to pay the extra cost?

Both authors replied briefly to the discussion and MR. J. CHRISTIE emphasized the need for communal testing facilities at the higher voltages. This country, he said, was tending to lag behind at the "super" voltages through lack of testing facilities. The rationalization of manufacture would be difficult but, if the requirements could be standardized, the industry would rationalize itself. During a recent visit to America he had been struck by the large amount of standardization being carried out there.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Hair Dryer

A HAND hair dryer of substantial construction is being made by FRACTIONAL H.P. MOTORS, LTD., Rookery Way, London, N.W.9. It has been named "Sylentflo" because it really is almost noiseless and remarkably free from vibration. It is driven by a shaded pole a.c. induction motor, so there are no brushes to cause sparking which might interfere with radio reception. The 40-W "skeleton" type motor has impregnated coils bound with silk tape and fitting into the hub of the machine, which is specially moulded for the purpose.

The fan is an aluminium pressing in two parts bolted together without rivets, each having 36 blades, forming a turbine wheel. The 360-W air heater within the exit spout is wound on mica. Two thumb switches, rated at 4 A each, are accommodated in the handle and a separate earthing conductor bonds all internal metal parts. The wiring is easily accessible.

Spot Welder

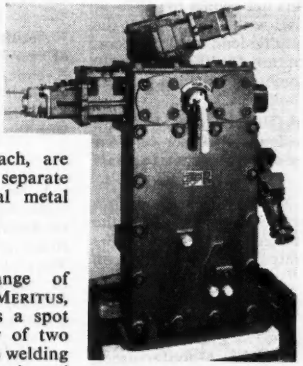
The latest addition to the range of "Autoforge" machines made by MERITUS, LTD., Wood Street, Barnet, Herts, is a spot welder of 40/80 kVA with a capacity of two $\frac{1}{8}$ in. (0·48 cm) mild steel plates. The welding time is adjustable from 0·06 to 4 seconds and the forging time up to 1·5 seconds. The feature of this model is that the foot pedal is interlocked to prevent its release by the operator before the timer has completed the welding cycle. Once the control timer has been pre-set, every spot is welded uniformly and independently of the machinist.

Gate-end Panel

To the range of flameproof gate-end panels made by A. REYROLLE & CO., LTD., Hebburn, Co. Durham, there has been added type-GA.10 incorporating an intrinsically safe circuit for the control of distant machines of the larger sizes now being introduced into coal mines. The rating of the panel, which is of the air-break contactor type, is 150 A at 400/625 V three-phase, and it is suitable for installation separately or as part of a multi-panel GA-type switchboard.

The welded steel enclosure is skid-mounted and within it are two entirely separate flameproof compartments. The upper accommodates three-air-insulated copper busbars terminating at each end of the enclosure in bushing terminals and a triple-pole reversing isolator, fully interlocked so that it must be "off" before the lower compartment becomes accessible. All connections from the busbar enclosure to the lower compartment are also taken through flameproof terminals, which are specially placed to allow easy access.

The lower portion contains a triple-pole electrically operated contactor, a triple-pole overcurrent relay unit complete with multi-range series overcurrent trip-coils, double-action oil-filled dashpots, auxiliary contacts and a lockout attachment, if required; a single-phase auxiliary transformer for the control circuit with primary tappings for 400 to 625 V and with a 30-V secondary; a set of push-buttons and change-over links to provide local control if required. Even when set for remote control the local stop switch can be used as required.



Gate-end panel for controlling larger-capacity mining machines

Earth-leakage protection, time-lag relay for sequence conveyors and a power sequence interlock can be added. Connecting boxes and plugs permit cables to be jointed and compounded away from the switchgear if required. The building up of units into multi-panel switchboards is done by inserting a connecting chamber between busbars and by adding tie-bars to the feet of the panels.

Kettle Connector

A sample connector for kettles and similar household appliances received from the POLRAD MANUFACTURING CO., 3, Central Parade, Catford, London, S.E.6, is sturdily made. It has a round body (produced by Merlin Mouldings, Ltd.) with the usual dual earthing strips and a rubber sleeve to protect the cable entry.

Industrial Equipment Exhibition

THE Engineering and Industrial Equipment (Home and Export) Exhibition will open at the Royal Horticultural Hall, Vincent Square, London, S.W.1, for two weeks from 10th to 24th March. Display space at the exhibition is limited and firms interested in exhibiting should make application to the Organizers, "Britain's Best" Exhibitions, 17-18, Henrietta Street, Covent Garden, London, W.C.2 (telephone: Temple Bar 4728-9).

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

E. K. Cole, Ltd., report that the net profit of the company and its main subsidiary, Ekco Ensign Electric Co., Ltd., was £104,740 for the year ended 30th September, as compared with £65,054 for the preceding year. The final ordinary dividend is 14½ per cent, making 22½ per cent, less tax, for the year (against 20 per cent). The participating dividend on the preferred ordinary is again 3 per cent.

Tecalemit, Ltd., reports net profits for 1946-47 of £114,125, as compared with £120,081 for the previous year. The final dividend is 14 per cent, maintaining the distribution for the year at 20 per cent. The final payment, however, is payable on increased capital.

David Brown & Sons (Huddersfield), Ltd., are paying an ordinary dividend of 10 per cent for the year ended 30th September last (against 5 per cent).

Aberdare Cables of South Africa, Ltd., has recommended a dividend of 2½ per cent for the first trading period ended 30th June. The company was incorporated in South Africa on 13th August, 1946.

New Companies

Morganite Resistors, Ltd.—Registered 9th January. Capital, £200,000. Manufacturers, exporters and importers of, and dealers in, electrical resistances and other component parts employed in the manufacture and assembly of radio and radar and other electrical equipment, carbon brushes (including brushholders), etc. Subscribers: D. H. Stapleton and E. T. Horne. Regd. office: Paulsway, Bede Estate, Jarrow.

Ross-on-Wye Radio, Ltd.—Registered 8th January. Capital, £600. To acquire the business of a wireless and electrical engineer carried on by L. M. Ricketts at Ross-on-Wye. Directors: L. M. Ricketts, J. A. Chaloner and C. J. Chaloner. Regd. office: 25, Broad Street, Ross-on-Wye, Herefordshire.

Regent Electrical Engineers (Poole), Ltd.—Registered 12th January. Capital, £2,000. Directors: B. A. Baird, J. P. Edwards, J. Faulkner and W. R. V. Bromley. Regd. office: 34, Parkstone Road, Poole, Dorset.

Lisburne Electric Co., Ltd.—Registered 14th January. Capital, £4,000. To acquire the business of a radio and electrical contractor carried on by A. F. Firmstone as Lisburne Electric Co. at Torquay. Directors: A. F. Firmstone and Mrs. J. E. Firmstone. Regd. office: 5, Lisburne Square, Torquay.

H. & G. Hails, Ltd.—Registered 14th January. Capital, £100. Manufacturers and dealers in lighting equipment, radio, television and domestic appliances, etc. Directors: G. F. Hails and H. G. S. Hails. Regd. office: 243, Addington Road, Selsdon, South Croydon.

Stockholders' Representative

MR. L. C. GAMAGE, Magnet House, Kingsway, W.C.2, has been appointed stockholders' representative of the Electrical Development & Securities Trust, Ltd., under the provisions of the Electricity Act, 1947.

Liquidations

Accumulators of Woking (1928), Ltd.—Meeting of members on 20th February at 24, Eastbury Avenue, Northwood, Middx., to receive an account of the winding-up by the liquidator, Mr. E. F. Lermit. (Members' voluntary winding-up).

Bankruptcies

E. G. Kershaw, carrying on business at Dale View, Luddenden Foot, Yorks, radio and electrical engineer, and now temporarily residing at 4, Ashton Road, Mytholmroyd, Yorks.—Last day for receiving proofs for dividend 28th January. Trustee, Mr. G. F. Morris, Hallfield Chambers, 71, Manningham Lane, Bradford, Official Receiver.

A. Fielding, residing and carrying on business at 223, Whalley New Road, Blackburn, electrician.—Order made 15th December, 1947, granting discharge subject to debtor's consenting to judgment being entered against him for £20 and £1 10s. costs, payable by monthly instalments of £2.

T. Shaw, residing at 65, Perth Street, and carrying on business at 495A, Anlaby Road, Kingston-upon-Hull, radio and electrical engineer, trading under the style of Radio & Electrical Service Engineering Co.—Last day for receiving proofs for dividend 27th January. Trustee, Mr. H. S. Bloomer, 8, Flottergate, Great Grimsby, Official Receiver.

F. H. Thomas, 19, Marlborough Road, Swansea, and **W. E. Evans**, 4, Morriston Terrace, St. Thomas, Swansea, and carrying on business in co-partnership at Salubrious Chambers, Salubrious Place, Swansea, under the style of Thomas & Evans, electrical engineers.—Last day for receiving proofs for dividend 28th January. Trustee, Mr. R. Betts, Government Buildings, 10, St. Mary's Square, Swansea, Official Receiver.

R. T. Morrison, carrying on business at 82, Lumb Lane, Bradford, electrical engineering contractor.—Supplemental dividend of 2s. 6½d. in the £, payable 27th January at the Official Receiver's office, Hallfield Chambers, 71, Manningham Lane, Bradford.

STOCKS AND SHARES

THE time is not yet in sight when the volume of money available for investment in stocks and shares is no longer likely to make its influence felt. Capital, which had been held back for reasons of caution on the part of its possessors, is flowing into the markets, more particularly those concerned with industrial stocks and shares. New issues continue to meet with a response so favourable that, in the majority of cases, subscription-lists remain open for only a few minutes. The rising tendency of transport stocks has culminated this week in several spectacular leaps. Tillings are now 92s. 6d., which compares with 77s. a week ago, British Electric Traction deferred at 1725 shows a gain of 160 points on the week, and of 225 on the month. The stimulus is the prospect of negotiations between the transport companies and the British Transport Commission, with a view to a sale of the transport interests. The gilt-edged list keeps tolerably steady and the British Transport 3 per cents revolve around 98½; that is, a discount of 1½ points.

Electricity Supply Shares

Attention has been called here, in recent notes, to the quotation of electric supply shares at prices which, including the expenses of a purchase, are equivalent to approximately par for the British Electricity stock to be issued as compensation. Calculation of the net final dividends which holders can expect to receive in respect of 1947 shows that net prices are, in effect, adjusted nicely to conform with the quotation of the new British Transport stock—issued as compensation to railway stockholders—at 98½. County of London ordinary, for instance, are due to be taken over at 49s. 5d. and the present price of 48s. is equivalent, after adding expenses and deducting the final assumed dividend, to 98⅜ for the proposed Government stock. London Associated at 28s. 6d., Midland Electric at 45s. 3d., and Bournemouth & Poole at 64s. 3d. are on much the same basis. In the case of North Easterns at 35s. 6d., Clyde Valley at 44s. 9d., and London Electric at 30s. 6d., the net equivalent price is 99 or a fraction more.

The Week's Changes

Electrical equipment shares have little change to show as a result of a moderately active week's business. The few alterations of any consequence are mostly against holders. British Insulated have shed 6d. to 38s. 6d. Henleys at 25s., Johnson & Phillips at 75s. 9d., Deccas at 37s. 6d., and Plessey at 21s. 3d. suffered minor losses. Babcocks and International Combustions are also lower at 71s. 6d. and 51s. 3d. respectively, and De La Rue have gone back 9d. to 48s. 3d. On the credit side is a further rise in Atlas Electrics to 15s. 3d. Electric Constructions are 2s. 6d. higher at 52s. 6d. Ever Ready, 40s., and British Aluminium, 53s. 3d., are a few pence better. In other markets, Calcutta Electrics at 45s. remain depressed by the postponement of negotiations for the sale of the undertaking.

Highest and Lowest

Last month's resolute advance of prices in the industrial markets reversed the autumn relapse emphatically enough to make worth while a comparison of present prices with the highest and lowest of 1947. Generally speaking, prices were at their best a year ago, and at their lowest either in the February fuel crisis, or, more often, in the September slump. The following shows the experience of a representative selection of electrical shares:—

Ordinary Share	High	Low	Now
A.E.I. ..	94s. 3d.	63s. 9d.	84s.
G.E.C.	103s. 9d.	79s. 6d.	95s.
Auto. Telephone ..	83s.	50s.	67s.
E.M.I.	29s. 6d.	16s. 3d.	19s. 6d.
Crompton Parkinson	35s. 3d.	23s.	30s. 6d.
B.I.C.	52s. 3d.	32s. 9d.	38s. 6d.
Johnson & Phillips	85s. 6d.	59s. 9d.	75s. 9d.
Ever Ready ..	52s.	31s.	40s.

Most prices, it will be noted, are around the half-way mark.

Prices and Yields

E. K. Cole satisfied expectations in raising the final dividend from 12 to 14½ per cent, making 22½ per cent for the year against last year's 20 per cent. Net profits have risen by over 50 per cent. At 20s. the 5s. shares yield £5 12s. 6d. per cent on the increased distribution. Shares at present on offer in the industrial market include a line of C. A. Parsons £1 ordinary at 70s. 4d., yielding £3 14s. per cent on the basis of the last dividend of 12½ per cent, paid before the company was made public last May. Chloride Electrical Storage "A" and "B" shares are offered at £5½, to yield £3 17s. 6d. per cent on the 20 per cent dividend paid on both classes.

South African Cables

Interest has increased lately in the 5s. shares of Aberdare Cables of South Africa. Introduced to the market a year ago at about 10s., they are changing hands now in the neighbourhood of 17s. 6d. If developments have proceeded according to plan, the new South African factories, designed to meet the local demand for electric cables and other equipment, will now be at the production stage. According to the particulars published at the time of the introduction, the company's first objective is to manufacture, in South Africa, cable as made at present by Aberdare Cables, the Glamorganshire company. The company intends also to produce electrical specialities similar to those of the South Wales Switchgear Company, and, at a later stage, equipment produced in this country by International Combustion. Meanwhile it has been acting as agent in the Union for the English cable company.

Next Week's Events

Monday, 26th January

BOURNEMOUTH. — Wedgwood Restaurant, Albert Road, 7.45 p.m. A.S.E.E. Bournemouth Branch. "Single to Three Phase Conversion Systems," by A. N. D. Kerr.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Installations Group. "Special Electrical Requirements of a Viscose Rayon Factory," by C. F. Freeman and H. V. Mather.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Informal meeting. Discussion on "The British Patent System and Procedure," to be opened by C. S. Parsons.

Alliance Hall, Caxton Street, S.W.1, 7 p.m. E.T.U. "Definitions and Standards of Skill in the Radio Trade."

At the Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 7 p.m. Institution of Electronics. "Electronic Organs," by L. E. A. Bourn.

NEWCASTLE-ON-TYNE.—Nevill Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Protective Finishing of Electrical Equipment," by F. Widnall and R. Newbound.

Tuesday, 27th January

GLASGOW.—The Royal Technical College, George Street, 6.30 p.m. I.E.E. Scottish Centre. "Speech Communication under Conditions of Deafness or Loud Noise," by Dr. W. G. Radley.

HARROW. — St. Hilda's Hall, 7.45 p.m. A.S.E.E. North-West London Branch. "Power Factor Improvement," by W. Gearing.

LEEDS.—Corporation Electricity Department, Whitehall Road, 6.30 p.m. I.E.E. North Midland Installations Group. "Generating Plant for Military Equipment," by K. H. Tuson.

LOUGHBOROUGH.—The College, 6.30 p.m. I.E.E. East Midland Centre. "Standardization of Switchgear," by D. E. Lambert and J. Christie.

MANCHESTER. — Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Installations Group. Paper by C. F. Freeman and H. V. Mather.

Wednesday, 28th January

LONDON.—John Adam Street, Adelphi, W.C.2, 2.30 p.m. Royal Society of Arts. "Recent Progress in the Making of Precision Instruments," by A. J. Philpot.

SHEFFIELD.—Royal Victoria Station Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "Developments in Magnetic and Acoustic Mines at the Admiralty Mining Establishment," by A. J. Baggott and C. H. Fawcett.

Thursday, 29th January

LONDON.—Connaught Rooms, Great Queen Street, W.C.2, 12.55 for 1 p.m. Batti-Wallahs' Society. Luncheon. "Application of Electricity to Ships," by J. A. P. Farrant.

Friday, 30th January

BRISTOL.—Merchant Venturers' Technical College, 7 p.m. I.E.E. Bristol Students' Section. "Design of A.F. Amplifiers," by E. H. Griffiths.

COVENTRY.—The Technical College, The Butts, 6.30 p.m. British Institution of Radio Engineers (Midland Section). "Some Aspects of Moderate Precision Temperature Control in Communication Engineering," by M. P. Johnson.

Masonic Hall, Little Park Street. Coventry Electric Club. Ladies' Evening.

FALMOUTH.—The Technical Institute, 7.15 p.m. Institute of Marine Engineers (Junior Section). "The Combustion Turbine," by J. Calderwood.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. Discussion on "Practical Considerations in Instrument Design," to be opened by D. C. Gall, Lt. Col. W. L. Beck, Prof. A. F. C. Pollard and R. d'E. Atkinson. (Joint meeting with the London & Home Counties Branch of the Institute of Physics.)

Storey's Gate, St. James's Park, S.W.1, 5.30 p.m. Institution of Mechanical Engineers. "Radio Valve Manufacture," by J. W. Davies, H. W. B. Gardiner and W. H. C. Gomm.

MANCHESTER.—Women's Engineering Society, 6 p.m. Visit to works of Salford Electrical Instruments.

Saturday, 31st January

HAYES—I.E.E. Southern Centre. 2.30 p.m. Visit to the works of the British Electric Transformer Co.

LONDON.—Women's Engineering Society (London Branch), 2.30 p.m. Visit to X-Ray Department, St. Bartholomew's Hospital.

I.E.E. London Students' Section Repeat visit to E.M.I. Studios, Ltd.

South African News

From Our Cape Town Correspondent

IN just over three months 1,254 agreements, with a value of £83,708, have been completed under the Cape Town City Council's hire-purchase scheme for electrical appliances. The scheme is stated to be working most successfully and there are good supplies of the various appliances.

Eight schemes costing £500,000 for supplying rural areas near Pretoria with electricity are being considered by the Electricity Department.

The Electricity Supply Commission is being asked to carry out an investigation into the power supply requirements in Port Elizabeth and the surrounding districts. The city electrical engineer recently advised the City Council to consider building a new power station not later than May, 1954, as the power demands of the region are rising steadily.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

BRITISH Thomson-Houston Co., Ltd.—"Preparation of synthetic resinous reaction products of aldehydes and triazine derivatives." 11869. 21st July, 1942. (596286.) "Starting control for electric discharge devices." 21136. 17th December, 1942. (596360.)

H. J. Enthoven & Sons, Ltd., and W. A. de Ville.—"Coil winding and like machines." 19834. 26th November, 1943. (596220.)

1944

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Synthetic compositions and products having molecularly oriented structures." 6699. 11th April, 1944. (596365.)

B. V. Rollin, J. G. Daunt and C. S. Wright.—"Electron discharge devices." 10489. 31st May, 1944. (596370.)

Standard Telephones & Cables, Ltd.—"Methods of making dry surface contact rectifiers." 14446. 26th October, 1943. (596372.) "Frequency changing signal generating system." 18897. 21st October, 1943. (596376.) "Electron discharge devices and method and means of adjusting same." 23497. 15th August, 1942. (596431.)

H. E. Page.—"Power operated shaver." 14935. 4th August, 1944. (596290.)

Marconi's Wireless Telegraph Co., Ltd., and A. J. Young.—"Cathode structures for magnetrons." 15094. 8th August, 1944. (596291.)

P. R. Mallory & Co., Inc.—"Primary cells." 16523. 10th December, 1943. (596224.)

Marconi's Wireless Telegraph Co., Ltd.—"Targets for cathode-ray tubes and the like." 17350. 28th November, 1942. (596428.) "Mounting of cathode-ray tubes in optical apparatus." 23889. 30th November, 1943. (596432.)

Metal & Thermit Corporation.—"Electrolytic deposition of tin." 18313. 27th April, 1944. (596375.)

H. E. Weinreb.—"Electric generators." 20508. 23rd October, 1944. (596297.)

General Electric Co., Ltd., and A. B. Osborn.—"Liquid spray guns." 22816. 17th November, 1944. (596231.)

1945

Welwyn Electrical Laboratories, Ltd., Callender-Suchy Developments, Ltd., N. F. Robbie and C. T. Suchy.—"Manufacture of electrical resistance elements." 945. 11th January, 1945. (596436.)

Standard Telephones & Cables, Ltd.—"Radio beacon." 1062. 15th November, 1943. (596391.) "Electron discharge devices." 1541. 31st January, 1942. (596437.) "Radio glide path systems for aircraft landing." 4030. 1st May, 1944. (596440.) "Telecommunication switching systems." 5242. 21st April, 1944. (596444.) "Cooling of high-temperature bodies." 5937. 13th March, 1944. (596445.) "Manufacture of metal contact rectifiers." 8130. 29th April, 1944. (596404.) "Method of making metal rectifiers." 8550. 2nd May, 1944. (596449.) "Electron-emitting cathodes and means for preparing the same." 18705. 3rd March, 1944. (596348.) "Directive antenna systems." 19227. 2nd June, 1942. (596479.)

British Thomson-Houston Co., Ltd.—"Synthetic resinous reaction products of an aldehyde and a triazine derivative." 1434. 20th January, 1944. (596309.) "Electric capacitors." 18795. 29th July, 1944. (596151.)

Standard Telephones & Cables, Ltd., and D. C. Rogers.—"Electron discharge devices and cathode-ray oscillograph time base circuits associated therewith." 1797. 23rd January, 1945. (596310.)

International Corrodeless, Ltd., S. T. Roberts and L. S. Larkin.—"Electro-plating equipment." 2102. 26th January, 1945. (596237.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Electric capacitors." 2157. 26th January, 1945. (596311.)

Patelhold Patentverwertungs & Elektro-Holding Akt.-Ges.—"High-frequency discriminators." 2381. 6th November, 1943. (596439.)

Farnsworth Television & Radio Corporation.—"Television signal combining amplifier." 2493. 5th February, 1944. (596394.)

General Electric Co., Ltd., and P. H. Collins.—"Cinematograph projectors." 2665. 2nd February, 1945. (Cognate application 15581/45.) (596395.)

British Thomson-Houston Co., Ltd., and H. F. Jefferson.—"Electrically driven soot blowers." 4561. 23rd February, 1945. (596239.)

Western Electric Co., Inc.—"Voltage wave generators." 4650. 24th February, 1944. (596314.) "Drift meters." 6925. 21st March, 1944. (596447.)

E. C. Axe (Hammond Instrument Co.).—"Electrical musical apparatus." 7260. 22nd March, 1945. (596319.)

Carnegie-Illinois Steel Corporation.—"Metal electrodes." 8907. 4th November, 1944. (596322.)

G. C. Jaillet.—"Device for heating feeding bottles by electricity." 9949. 16th February, 1944. (596327.)

J. Lucas, Ltd., J. A. Laird and J. W. Reid-Jones.—" Regulating means for alternating electric current generators." 12015. 14th May, 1945. (596244.)

British Broadcasting Corporation, H. Davies, P. E. A. R. Terry and W. J. Lloyd.—" Recording of sound." 12112. 14th May, 1945. (596245.)

S. A. Pollock.—" Electric storage cells and batteries." 12974. 24th May, 1945. (596247.)

Bendix Aviation Corporation.—" Carbon pile electric regulator." 13174. 4th April, 1944. (596248.)

E. P. Murray.—" Rectification of a.c. electricity in radio receivers suitable for operation on both a.c. and d.c. supplies by valves having indirectly heated cathodes." 13261. 28th May, 1945. (596335.)

L. Dodeux.—" Electric switches for flexible conductors." 14503. 11th February, 1941. (596458.)

Kolster-Brandes, Ltd., and A. B. Atkinson.—" Electric inductors." 14896. 12th June, 1945. (596411.)

A. H. Stevens (Electronic Laboratories, Inc.).—" Electric voltage modifying systems." 15076. 14th June, 1945. (596337.)

Teddington Controls, Ltd., W. F. F. Martin-Hurst and E. J. Bush.—" Electrically operated counting mechanism." 15457. 18th June, 1945. (596340.)

Mantle Lamp Co. of America.—" Inductor tuning system." 16299. 14th August, 1944. (596342.)

E. L. C. White.—" Electrical counter circuits." 16571. 29th June, 1945. (596459.)

Babcock & Wilcox, Ltd., R. E. Zoller and E. G. Weeks.—" Fluid heater cleaners." 18404. 18th July, 1945. (Addition to 565110.) (596252.)

H. Barker (F. Sauter Akt.-Ges. Fabrik Elektr. Apparate). — " Thermo-responsive device for electrical controlling apparatus." 18594. 20th July, 1945. (596254.)

Standard Telephones & Cables, Ltd., and A. M. Searle.—" Selenium rectifiers." 18643. 20th July, 1945. (596347.)

English Electric Co., Ltd., and F. Wilson.—" Electric switches having self-aligning contacts." 18807. 23rd July, 1945. (596156.)

Igranic Electric Co., Ltd.—" Braking systems for induction motors." 18811. 22nd July, 1944. (596157.)

Standard Telephones & Cables, Ltd., F. H. Bray, L. R. Brown and D. S. Ridler.—" Automatic telecommunication exchange systems." 18826. 23rd July, 1945. (596161.)

British Thomson-Houston Co., Ltd., and T. F. Stent.—" Electric irons." 18849. 23rd July, 1945. (596171.)

General Electric Co., Ltd. (D. M. Smith).—" Driving systems, for example, ship propulsion systems, of the type including opposed-piston engines." 18857. 23rd July, 1945. (596174.)

Automatic Telephone & Electric Co., Ltd., and G. D. Turton.—" Electrical signalling systems." 18889. 24th July, 1945. (596179.)

British Thomson-Houston Co., Ltd., and G. H. Govas.—" Apparatus for detecting flaws in metal wire." 18929. 24th July, 1945. (596182.)

Evershed & Vignoles, Ltd., and J. C. Needham.—" Speed measuring instruments." 24th July, 1945. (596188.)

Landis & Gyr Soc. Anon.—" Volt ampere meter for a limited range of power factor." 19072. 21st February, 1941. (596265.)

A. Reyrolle & Co., Ltd., and H. Mordue.—" Electric resistors." 19082. 25th July, 1945. (596266.)

G. H. Collins and H. F. Collins.—" Electrically heated kettles and utensils." 19127. 26th July, 1945. (596277.)

Holophane, Ltd. (Holophane Co., Inc.).—" Luminaires." 19185. 26th July, 1945. (596354.)

British Insulated Callender's Cables, Ltd., and A. B. F. G. Richardson.—" Ovens for baking enamelled wires." 19190. 26th July, 1945. (596469.)

R. Sarazin.—" Machines for arc welding with a metallic electrode." 19205. 8th January, 1944. (596204.)

Scophony, Ltd., and H. F. Charlotte.—" Electric discharge lamps." 19218/19. 26th July, 1945. (596475/6.)

T. E. Wynne.—" Phase measuring circuits for electric oscillations." 19226. 26th July, 1945. (596478.)

Automatic Telephone & Electric Co., Ltd., and E. E. Comfort.—" Automatic switches as used in telephone systems." 19235. 27th July, 1945. (Addition to 578720.) (596482.)

E. K. Cole, Ltd., L. J. Bannister and W. H. Crouch.—" Manufacture of lamp filaments." 19241. 27th July, 1945. (596485.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Electric measuring and indicating systems." 19334. 27th July, 1945. (596492.)

Victoria Machine Tool Co., Ltd., J. Selby and G. O. I. Krieger.—" Electric circuit controlling apparatus, particularly for effecting selected cycles of movements say of the work tables or the like of machine tools." 27035. 16th October, 1945. (596207.)

1947

Communication Engineering Pty, Ltd., and J. C. Stewart.—" Multi-channel telephone systems." 9096. 23rd August, 1944. (Divided out of 595712.) (596495.)

" Cheerful Rationing " Cards

In addition to further economical recipes, answers to electrical and other problems arising from present shortages are now given on the " Cheerful Rationing " cards issued by the Electrical Association for Women. The January number is the 99th of the series, and over half a million cards have now been issued.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Acton. — 4th February. Corporation. Erection and assembly of concrete lamp posts and equipment. (See this issue.)

Cheadle and Gatley.—16th February. Electricity Department. Cables, lamps, meters, and street lighting standards and fittings for the year ending 31st March, 1949. (See this issue.)

Cleethorpes. — 9th February. Electricity Department. Four 500-kVA transformers. (9th January.)

Gainsborough.—2nd February. Electricity Department. One 500-kVA and one 250-kVA outdoor type transformers. (See this issue.)

Hull.—30th January. Electricity Department. Diesel electric shunting locomotive. (See this issue.)

30th January. Electricity Department. Motor-operated lathe. (See this issue.)

Kent.—14th February. County Council. Applications are invited from firms for inclusion in the Council's approved list of contractors for electrical and engineering works. (See this issue.)

Manchester.—31st January. Electricity Committee. Electric cookers and boiling plates for the year ending 31st March, 1949. (16th January.)

Mitcham.—10th February. Town Council. Electric lamps for one year from 1st April. Borough engineer, Town Hall.

Plymouth.—31st January. Electricity Department. 500-MVA, 33-kV metalclad switchgear. (9th January.)

28th February. Electricity Department. Electric motors for generating station auxiliaries. (See this issue.)

Reigate.—30th January. Corporation. Electrical installations in flats and laundries. (16th January.)

Orders Placed

Durham.—City Council. Accepted. Installation of fluorescent lighting at branch library (£112).—North of England Engineering & Electrical Co.

Fulham.—Electricity and Lighting Committee. Reorganization of distribution system:—6·6-kV ring main feeders (£5,722) and e.h.v. feeders at various substations (£14,928).—Aberfren Cable & Construction Co. Substation switchboard (£1,417).—A. Reyrolle & Co. Panels at substation (£1,708).—Ferguson Pailin.

Keswick.—U.D.C. Accepted. Electric wiring in twenty-four houses at Brigham (528).—Keswick Electrical Services.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors. It must be borne in mind that many of the projects mentioned may be postponed as a result of the Government's suspension of building activities for the time being.

Aldershot.—Senior school; S. Low, county architect, The Castle, Winchester.

Aylesbury.—Three pavilion wards at Manor House Institution; county architect, County Offices, Aylesbury.

Barnsley.—Two schools (£128,113), Athersley and Stairfoot; borough engineer.

Basingstoke.—New works, Kingsclere Road, for Lancing Bagnall, Ltd., Isleworth (£20,000); W. H. Mussellwhite & Sons, builders, Eastrop Works, Basingstoke.

Blackburn.—Houses, Dinckley and Balderstone, for R.D.C.; Greenwoods Building Industries, Ltd., Salem Works, Lees Road, Oldham.

Boldon (Co. Durham).—Canteen for United Analysts, Ltd.; Cowell & Rawlings, builders, Sunderland.

Braughing.—Houses (68), Buntingford; R. H. Sell, clerk to R.D.C., 2, Hockerill Street, Bishop's Stortford.

Bridgwater (Somerset). — Factory; Danish Bacon Co., Ltd., Cowcross Street, London, E.C.1.

Bury.—Laundry additions, Brighton Street; Bury & District Laundry Co., Ltd.

Consett (Co. Durham).—Houses (400) for U.D.C.; J. J. Eltringham, 46, Durham Road, Blackhill, Co. Durham.

Didcot.—Primary school, for Berks C.C.; county architect, 35, Bath Road, Reading.

Eastbourne.—Junior school, The Hydneye, Hampden Park; borough engineer, 2-4, Saffrons Road.

Garstang.—Agricultural workers' houses (140) for R.D.C. and Agricultural Executive Committee; surveyor, Union Offices, Garstang, Lancs.

Gorleston.—Junior school, Beccles Road (£67,840); H. A. Holmes & Son, Ltd., builders, Gorleston.

Kirkburton.—Factory, Blind Lane, Burton Dean; B. H. Moxon & Sons, Ltd., worsted manufacturers, Springfield Mills.

Lancaster.—Houses for R.D.C.; Fairhope Estates, Ltd., builders, Westgate, White Lund, Morecambe.

Loughborough.—Secondary modern school, Outwoods Drive; county architect, Grey Friars, Leicester.

Manchester.—Houses (100), Ford Bank, Didsbury; Ford Bank Estates, Ltd., 25, Cross Street, Manchester, 2.

Offices, 609, Stretford Road, Old Trafford, for W. J. Brookes & Sons, Ltd.; Derham, McKeith & Partners, architects, Empress Buildings, Blackpool.

Middleton.—Offices, and rebuilding factory, Manchester New Road; Tonge Dyeing Co., Ltd., Tonge Mill.

Newcastle (Staffs).—Houses (50) for T.C.; Pauling & Co., Ltd., builders, 26, Victoria Street, London, S.W.1.

Newcastle-on-Tyne.—Offices, Union Road, for the Windsor Casing Co., Ltd.; J. Horn, builder, 3, Pott Street, Gateshead.

Oldham. — Grammar school, Counthill; schools architect, Education Offices, Union Street West.

Ormskirk.—Agricultural workers' houses (32), County Road site; U.D.C. surveyor, Burscough Street.

Otley.—Factory, near Birdcage Walk; William Eyres & Sons, Ltd., woollen manufacturers, Harrison Works, Leeds Road.

Rotherham.—Central bus station, Drummond and Frederick Streets; borough engineer.

Salford.—Extensions and alterations, North Salford Secondary School, Broughton (£50,000); W. A. Walker, borough engineer, Town Hall, Bexley Square, Salford, 3.

Extensions to works, Caroline Street, Broughton, for Erskine, Heap & Co., Ltd.; H. S. Fairhurst & Son, architects, 55, Brown Street, Manchester, 2.

Sheffield.—Workshops and alterations to works, Valley Road and Joiner Lane; J. Tyzack & Son, Ltd., Meersbrook Works, Heeley.

Silloth (Cumberland).—Factory, Eden Street, for S. Redmayne & Sons, Wigton.

Southport.—Grammar school, Churchtown, and extensions to Technical College (£250,000); borough engineer.

South Shields.—School dining rooms, etc., at Cleadon Park Secondary School, Ocean Road School and the Baring Street School; Ministry of Works, Newcastle-on-Tyne.

School in the Wenlock Road area; education secretary, Town Hall.

"Newland" houses (50); borough engineer.

Stafford. — Crematorium; T. H. Higson, borough surveyor, Borough Hall.

Stourbridge.—Canteen at King Edward VI School; L. C. Lomas, county architect, 60, The Tything, Worcester.

Stretford.—Houses (30), Moss Park site; Albert Locke (1940), Ltd., builders, 166, Lostock Road, Davyhulme.

Uttoxeter.—School (£250,000); A. C. H. Stillman, county education architect, County Buildings, Stafford.

Warrington.—Office buildings, Manchester Road, for Ministry of National Insurance; Office of Works, Abell Street, John Islip Street, London, S.W.1.

Watford.—Houses (24), Hazelwood Lane, Hunton Bridge, for R.D.C.; Dawe & Carter, 83, High Street.

West Bromwich.—Extensions to works for J. Ashmore, Bromford Lane; Ashbarham (Builders), Ltd., Union Street.

Wolverhampton.—Secondary school, Bushbury (North) housing estate (£245,000); W. M. Law, borough engineer, Town Hall.

Worsborough. — School ; H. Bennett, county architect, County Hall, Wakefield.

York.—Traditional houses (50), Muncaster estate; Charles J. Minter, city engineer,

Testing Oil Engines

AN exhibition of experimental test equipment used in high-speed oil-engine research was held recently in the research laboratories of F. Perkins, Ltd., Peterborough, primarily to give the company's employees an opportunity to see the technical resources available and generally increase their interest in scientific matters. The demonstrations were mainly of the various instruments employed to ascertain the behaviour of new designs.

Among the many electrical instruments for measuring pressure, temperature, speed, vibration, stress, air consumption and exhaust gas density, an item which aroused a great deal of interest was a two-channel recording cathode-ray oscilloscope with additional time and event marking tube and a separately visible 6 in. monitor cathode ray tube. This instrument facilitates the recording of two quite independent functions of engine behaviour which can be related to time and engine crankshaft position. It can also be used for recording pressures of from 0·005 lb (0·002 kg) to 20 tons per sq in. varying from static conditions up to 10,000 cycles per second. This enables cyclic engine conditions to be recorded at crankshaft revolutions of several thousands per minute. Apart from pressures this instrument will record many kinds of engine noise, vibration or stress. Various methods of speed measurement were shown, including the use of the stroboscope and remote electrical tachometers. A smokemeter used to measure the engine exhaust density when on the production test bed consists essentially of a tube through which the exhaust gas passes interrupting a beam of light focused on to a photo-electric cell.